2002

Vision 2002

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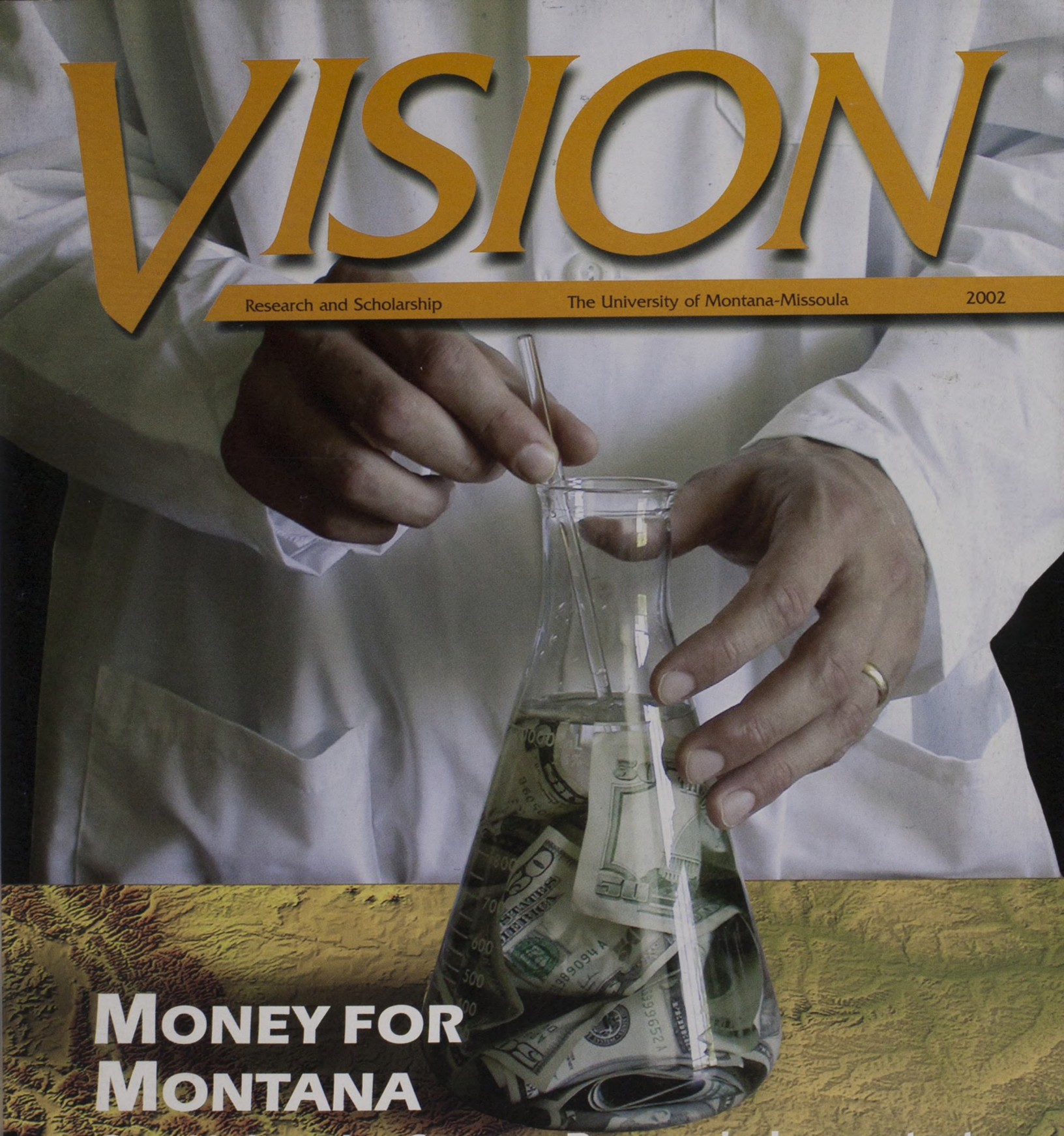
Research and Scholarship The University of Montana-Missoula 2002



MONEY FOR MONTANA

Can University System Research Jump-start the State's Economy?

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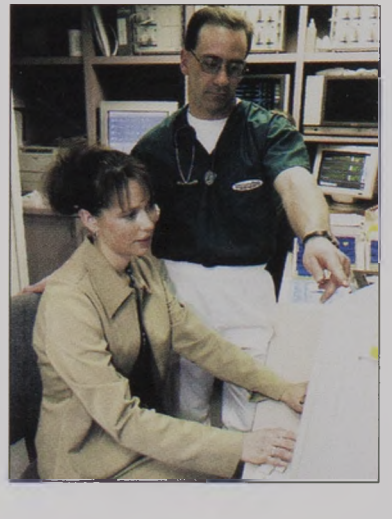

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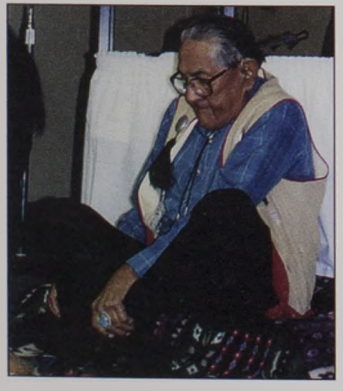

Staff

Publisher
T. Lloyd Chesnut

This magazine was produced by the award-winning University Relations news and publications team of:

Co-Editors
Brenda Day
Rita Munzenrider
Cary Shimek
Patia Stephens

Graphic Designer
Mike Egeler

Photographer
Todd Goodrich

Contributing writers
Gary Jahrig
Vikki McLaughlin
Elias Okach
Michael Santana

Editorial Office
University Relations
327 Brantly Hall
Missoula, MT 59812
(406) 243-4824
munzen@selway.umt.edu

Research Office
Office of the Vice President for Research and Development
Judy Fredenberg
116 Main Hall
Missoula, MT 59812
(406) 243-6670
fred@selway.umt.edu

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Cover photo illustration by Todd Goodrich

The University of Montana

On behalf of the individuals in my office and research-related units, I welcome you to this latest issue of Vision. The following pages highlight a variety of scholarship and sponsored activities at The University of Montana. I invite you to peruse this issue to get a feel for the University's stellar and diverse activities in teaching, research and service — activities that stretch far beyond the parameters of the Missoula campus.

September 11 changed the nation. I propose that one resulting tenet is our shared awareness that it's people who are important: the relationships, the friendships, the personal ties, the colleagues. Similarly, it is the people of UM who give meaning to everything we do as an institution. From this nucleus, outreach efforts ripple out and across the state, region and nation like the proverbial pebble tossed into a pond. Perhaps at no time like the present are we more aware of our local, regional, national and global interconnectedness.

Arguably the most visible impact made by UM is in the area of economic development. Economically strong states across the nation have invested in their institutions of higher education, recognizing that university research is the engine that drives economic growth. Montana is no different. This fall we celebrated the grand opening of a small business incubator called the Montana Technology Enterprise Center, or MonTEC. A collaboration between UM and the Missoula Area Economic Development Corporation, MonTEC provides fledgling companies a site in which to develop and commercialize their technologies. Satellite sites are being developed in Flathead, Lake and Ravalli counties; these four sites combined make up the Northern Rockies Research Park and Technology Corridor, or NorCor.

While the positive impacts made by UM are easily recognizable, often less tangible is the University's involvement in the many collaborative activities that reach to our state borders and beyond. Last winter, for example, with Montana State University and others, UM was instrumental in organizing and delivering technology transfer outreach activities that stretched across the Big Sky Country. Day-to-day collaborations between UM and MSU faculty, staff and researchers routinely occur in all academic areas, and these collaborations all positively impact the state. Again, it is the relationships, the friendships, the personal ties and the colleagues that matter and make a difference in our lives and our state.

In summary, with more than $50 million in grants, UM has reached a record high. I am proud of our scholars and their accomplishments. Their dedication epitomizes Montana's work ethic, and we are all beneficiaries of their exemplary teaching, research and service.

T. Lloyd Chesnut

T. Lloyd Chesnut
Vice President for Research, Development and Graduate Studies

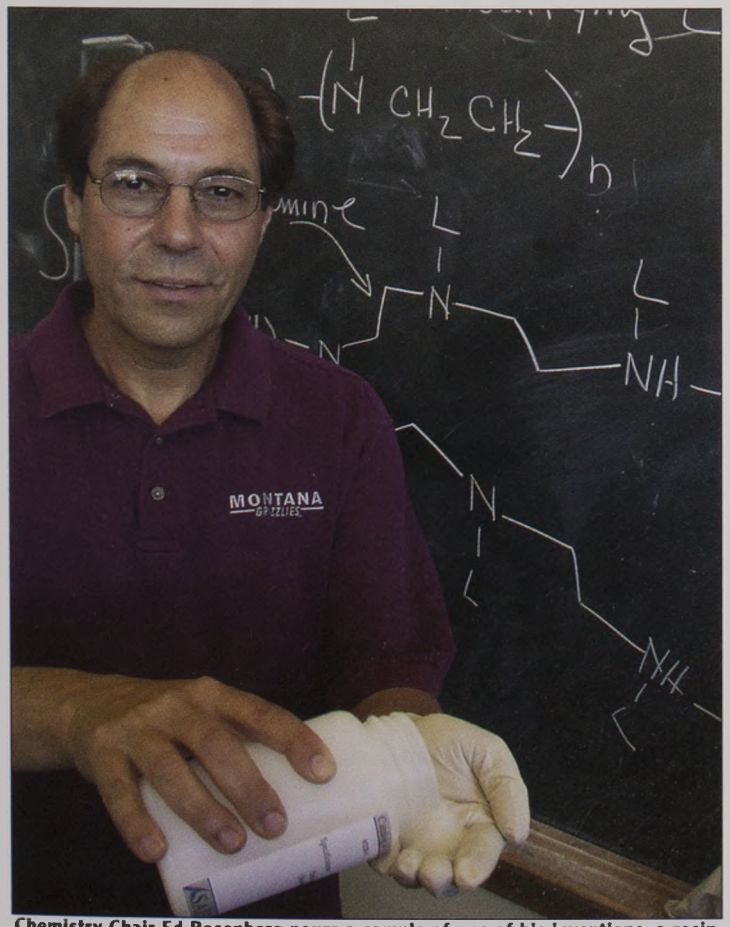
Priming the Pump

UM Cranks Up State's Economic Engine

by Cary Shimek

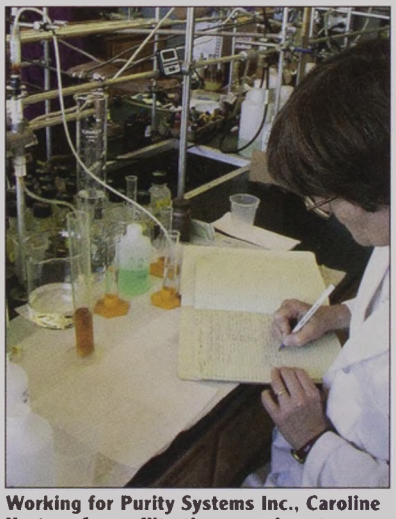
When he first came to The University of Montana, Associate Professor David Opitz helped NASA count volcanoes on Venus.

It would take a skilled scientist at least 10 years of constant work to map all the volcanoes in NASA's 30,000 digital images of the superheated planet, so Opitz, an expert on artificial intelligence and machine learning, was tasked to write computer software that could automate the process. This would require software that recognizes which little ones and zeros in the digital images actually add up to volcanoes — a program that "learns" from its mistakes and becomes better at its task over time.



Chemistry Chair Ed Rosenberg pours a sample of one of his inventions, a resin that cleanses heavy metals from streams.

The 35-year-old Helena native met with some success, and a partner convinced him the new technology could have many applications closer to home. Thus Visual Learning Systems was born in 1999, and the company already employs 12 people at various levels. The firm's award-winning Feature Analyst software distinguishes fine details in satellite images, automating a task once performed with less accuracy and much more slowly by people. Sixty percent of sales have been to the government, especially the Department of Defense.



Working for Purity Systems Inc., Caroline Hart performs filtration experiments.

"This has become a second job to me," Opitz says, "and I've learned that the initial idea is just 2 percent of getting into business. But I really think we have good potential for growth."

Another company spawned by UM research, Purity Systems Inc., markets a resin that preferentially removes heavy metals dissolved in liquid streams. The product's inventor, UM chemistry department Chair Ed Rosenberg, said the resin has applications for mining, electroplating and environmental cleansing.

Rosenberg says Purity Systems could lead to more environmentally benign mining, since the resin removes metal without smelting. The product already is being tested at mines in Australia and Chile.

He says the company now employs more than a dozen workers, and more jobs could be on the way. "I could see a company like this easily employing 50 to 100 employees," he says. "If we could land one commercial installation, that could put us over the top."

Building business in Montana

UM always has helped Montana's economy by providing a highly skilled workforce. The University also participates in

Jon "Tony" Rudbach, assistant vice president for research and economic development, removes his hard hat in the new Montana Technology Enterprise Center.

The business incubator is located in a freshly remodeled facility formerly known as the Sheehan-Majestic Building.

economic development through the licensing of its intellectual properties — patents, copyrights and trade secrets developed by UM researchers. The state Board of Regents also has mandated that UM and its university system partners become more active in developing Montana's economy.

UM's economic development guru is Jon "Tony" Rudbach, assistant vice president for research and economic development. It's his job to move the University's intellectual properties from the laboratory to private-sector businesses — a process called technology transfer.

He says UM strives to create technology-based businesses for Montana, which pay more, are more environmentally friendly and require a skilled workforce, so the jobs can't easily be exported to other countries for cheap labor once the companies become profitable.

"We try to use our resources to develop wealth for the state of Montana," Rudbach says. "We have a lot of entrepreneurs and good ideas in this state, and we need to support and nurture them."

He says UM research has produced more than 20 U.S. patents that already have spun off six or more new Montana businesses, firms such as Visual Learning Systems. Many of these patents were produced by UM's Shafizadeh Rocky Mountain Center for Wood and Carbohydrate Chemistry, which has converted natural carbohydrates into a variety of compounds. One example is a larch tree extract that protects food from disease-causing bacteria. That product is made from Libby-area trees, and it was licensed to Larex, a Minnesota company. Rudbach says licensing UM patents generates revenue for the University and its faculty inventors.

He says Montana State University-Bozeman has been a leader in generating new businesses, mainly because of its engineering school and Advanced Technology Park, which houses and assists new or expanding companies. Rudbach says UM will contribute more in the future with the recent opening of the Montana Technology Enterprise Center (MonTEC), a new business incubator designed to help businesses realize their goals.

Incubating dreams

MonTEC, which opened for business this summer, was created through the efforts of UM and the Missoula Area Economic Development Corp. Intended to stimulate Montana's economy by assisting startup or expanding companies, the incubator is located in a former food warehouse along the north shore of the Clark Fork River, just across the river from the UM-Missoula campus.

Rudbach says the $4.5 million incubator is being built in two phases, primarily with federal funding. Phase I, which is up and running, includes three labs, nine offices and shared common areas. It covers about 16,000 square feet. Phase II will double the incubator's available space with another eight labs and 18 offices when completed early in 2003.

"For Phase II we already have a waiting list of companies that are requesting 40,000 square feet just for themselves," he says. "When Phase II is completed, we will have 32,000 feet total. This shows how much need is there."

> *"We try to use our resources to develop wealth for the state of Montana."*
>
> Jon Rudbach

The cluster of businesses housed in the incubator receive high-speed Internet access, fax and copy service, secretarial service, office and lab space, and use of conference rooms. Entrepreneurs also get ready access to a host of business advisers provided by UM and the Missoula Area Economic Development Corp., and MAEDC is now headquartered in and managing the new facility. Rudbach says rent in MonTEC is comparable to other business space in Missoula, but the many benefits have enticed renters to sign on.

Perhaps the greatest benefit of being in the incubator, he says, is sharing a building with an energetic community of entrepreneurs who share ideas and marketing efforts.

UM and MAEDC worked to site an incubator in Missoula for more than five years. The two organizations eventually landed a $1.5 million grant from the federal Economic Development Administration to launch the project. Rudbach also wrote a series of Housing and Urban Development grants

that funded the enterprise, and UM provided a land match that was instrumental for the grant-writing and fund-raising efforts, which continue to this day.

Though UM and MAEDC created MonTEC — and University officials hope many of their intellectual properties will flower into new businesses there — the incubator is actually operated by an independent corporation with its own board of directors. The board has an equal number of members from UM and from the business community.

"MonTEC is a separate entity so it has access to economic development money that cannot come to an institution of higher education," Rudbach says. "We wanted it to be a stand-alone facility that will enhance our economy for the enrichment of the state."

He says MonTEC businesses will be evaluated continuously to ensure they are progressing toward their goals. When these goals are reached, the businesses will be graduated out of the incubator to "the real world." Several of the first tenants are businesses generated by UM research, such as Purity Systems.

Rudbach says those involved in designing the incubator visited many such facilities in the Pacific Northwest during initial planning stages.

"We found out what they did right, what they did wrong, and learned a tremendous amount," he says. "Fifty percent of our space is offices, and that's what everybody told us: You've got to have offices; you can't make it with just laboratories. And this sounds funny, but the offices have to have a window. So all the offices in the outside wall had a window cut for them. We had to make sure tenants come in and find a user-friendly space."

A grand opening for MonTEC was held in September.

Highway to success

MonTEC is an important part of what Rudbach calls the Northern Rockies Research Park and Technology Corridor (NorCor), a consortium of four counties along U.S. Highway 93 that have joined forces to promote economic development. NorCor involves Missoula, Ravalli, Lake and Flathead counties.

Rudbach says NorCor came about because the University wished to expand its economic-development outreach. One goal of NorCor is to place a business incubator or technology park in each county.

MonTEC is the facility for Missoula County, and Rudbach is working with developers in the other counties to establish more incubators — preferably linked to an institution of higher learning. In Flathead County, for example, an incubator associated with Flathead Valley Community College in Kalispell soon may be built on college land. In Lake County the incubator will be affiliated with Salish Kootenai College in Pablo. Ravalli County already intends to site its incubator in a business park near the airport, though that one won't be closely associated with an educational institution.

"We originally thought about having one mega-facility, but we realized once businesses get established in a place, they don't want to leave," Rudbach says. "We didn't want to take resources from these smaller communities and place them in Missoula. We want fair and balanced growth in all the counties."

Another piece of the NorCor puzzle is mentoring, providing the advice Montana entrepreneurs need to get going. Rudbach says the state's Small Business Administration offices and UM business school have been helpful with these efforts. As an example, Jakki Mohr, a UM marketing associate professor, has her

Associate Professor David Opitz displays software made by his company, Visual Learning Systems.

University classes write marketing plans for fledgling technology companies.

Rudbach says NorCor also promotes high-speed Internet access to improve communications for Montana technology companies. In addition, the organization seeks venture capital to support new businesses. Along this vein The Montana Fund (TMF) has been established to provide investment capital for businesses that don't meet the strict qualifications of traditional bank loans or venture-capital funds. Managed by the Montana Community Development Corp. program, TMF will be based in Helena and is intended to service the entire state.

"Hopefully it will be operating toward the end of the year," he says.

Rudbach envisions an economic development corridor similar to NorCor taking root along Interstate 15, linking the communities and educational institutions of Great Falls, Helena and Butte. He hopes that such business-friendly areas — linking a region's resources and aggressively promoting entrepreneurship — eventually will generate wealth that spills across the state.

Though he wants Montana to foster a business-friendly climate, Rudbach isn't in favor of recruiting more mega-corporations and box stores into the state. He said most of the work being done in the new economy comes from smaller companies.

"We're not so much in favor of recruiting existing businesses to Montana," he says. "What we want to do is create new businesses in Montana."

Want to Start a Montana Business?

Here are three single-point contacts to help you:

- Jon "Tony" Rudbach, assistant vice president for research and economic development at UM-Missoula, (406) 243-2148.
- Rebecca Mahurin, director of intellectual property at MSU-Bozeman, (406) 994-2752.
- Linda Brander, outreach coordinator for the Montana Department of Commerce, (406) 841-2749.

Montana's economic engine

Rudbach says it's tough in eastern Montana, where many communities seem on the verge of drying up and blowing away as they struggle to find new roles in the changing economy. So last winter he and other economic development officials crammed into a Suburban and logged more than 3,700 miles crisscrossing eastern Montana to visit entrepreneurs and promote resources available for businesses through the Montana University System and state government.

They encountered enthusiastic overflow crowds in every community they visited (except Hardin, where a basketball tournament was going on). Rudbach says they met many bright, innovative people.

At the Glasgow meeting, for example, they learned of the Lefsa Shack in the tiny community of Opheim, which markets its flat Norwegian pastry to all 50 states. The company gobbled up 82,000 pounds of potatoes to produce 51,000 pounds of lefse last year.

"We can create industries for a lot less money in these small communities," Rudbach says, "and they are lovely places to live with just the nicest people you would ever want to meet. But many of these places have high unemployment and buildings boarded up. But look at this opportunity: cheap available space and a workforce. There's no reason that Ekalaka, Alzada and Wolf Point can't enter the new economy. All you need is a satellite dish, and we saw examples of that out there."

Rudbach says people at the meetings told them that fledgling entrepreneurs often are bewildered by the economic development system and the huge list of resources available to them. So Rudbach and his cohorts have developed three single-point contacts for all Montanans to call for assistance. These contacts may not have immediate answers, but they will get entrepreneurs in contact with in-the-know people for most business questions *(see box at left).*

Rudbach says he wants to promote the idea among Montanans that their university system is a resource available to help jump-start their business ideas. Universities can help with grant-writing efforts, business plans and more. UM, for example, can educate people about federal programs such as the Small Business Innovative Research Program, which distributes about $3 billion a year to companies with promising ideas.

He says the university system also has started "phase 0" programs, which help people learn about available grants and become more competitive at writing them. All it takes is a phone call.

Though much is being done to charge Montana's economic engine, Rudbach says much more is necessary before the state's average per-capita income rises from the basement of the national rankings.

"We need more resources to get economic development going," he says. "We need to show our legislators that this is the right way to go: not abandon our traditional agriculture and extractive industries, but certainly supplement them with new technologies by entering the new economy. Right now I think this state has a marvelous opportunity and a lot of dedicated people ready to get going." V

UM Research and the Economy

Research at University of Montana campuses contributes to the state's economy in many ways. Here are a few examples:

- UM-Missoula's Research and Development Office, combined with Montana Tech in Butte, brought in $49.5 million in fiscal year 2001. Personnel costs average about 65 percent of research activity, which correlates to a payroll of more than $32 million.
- Research dollars support a significant number of UM faculty and staff positions. Without this funding, these employees would be unavailable or their positions would require tax funding for their teaching, research and service functions.
- Many Montana businesses benefit from products produced by UM research. Among many examples is Larex, a Minnesota company that pumps about $4 million annually into the state's economy to purchase "waste" larch tree stumps from Montana forests. The stumps are used to create a chemical used in foods and pharmaceuticals. Other successes include Headwaters Composites and Visualization Software, companies spawned by UM's federally sponsored research in wind energy. Directory Images World Wide in Missoula, a company spun off from University research and development, uses software that works like an operating system.
- UM's Small Business Institute has provided outreach to hundreds of the state's small- and mid-sized businesses through student consulting services since 1977. Teams of seniors work with each client, company or entrepreneur to develop business or marketing plans or conduct studies.
- UM's Montana Business Connections provides access to two practical and useful databases: the Resource Directory, which provides current information on more than 1,000 economic development resources, and the Business Calendar, which lists upcoming Montana conferences, trade shows and other business-related events.
- The Montana Tech library is the only U.S. patent and trademark depository in Montana. Its librarians answer questions weekly from inventors and business researchers from across the state about how to obtain patents and trademarks. Many Montanans start businesses using these inventions. The librarians also do community outreach to teach new business owners about market research, business surveys and business plans.
- Tech's Rocky Mountain Agile Virtual Enterprises (RAVE) project helps companies become more competitive by boosting their network technologies. The institution's Mine Waste Technology Program also generates between $500,000 and $750,000 in projects each year.
- The Montana World Trade Center, located in UM's Gallagher Building, encourages the expansion of world trade and works to make our region competitive in the global market. The center's Montana Environmental Consortium Project has worked for the past year to create business links with Panama. As a result of this public-private collaboration, UM won an InterAmerican Development Bank grant to provide legal consultation to the Panamanian government on the development of its natural resources and extraction policy and practice. The grant is worth about $500,000. The planned second phase of this initiative calls for $28.5 million in private-sector environmental services contracting, for which Montana businesses should be in a good position to compete.
- The Montana Manufacturers Information System now is under development in UM's business school. MMIS will census all manufacturers in the state and collect data on products, processes, capabilities, certifications, specialized equipment and other information. The system will help Montana manufacturers locate potential customers by linking them to worldwide markets. V

When Gardening Really is Rocket Science

by Gary Jahrig

The Aqua satellite launched in May 2002 carries software designed by UM researchers.

When it comes to gardening, Steve Running prefers to think big.

"We're trying to do for the whole world what a gardener does with his garden," says Running, a UM forestry professor. "We want to chart seasonal patterns and how they change."

Running, who has received more than $10 million in grant money from NASA in the past three years to pursue earth science via outer space, believes the computer software loaded on the recently launched Aqua satellite will give him and his colleagues at UM the tools they need to better monitor the gardens of the world.

Coupled with the Terra satellite, launched more than two years ago with UM-designed software that represented Running's initial stab at outer-space earth science, Aqua should give scientists in Missoula and around the world a complete look at global vegetation and drought patterns.

"The names aren't gimmicks," Running says. "They will each give a different snapshot of the Earth. NASA built both sensors at the same time. The only difference will be the afternoon orbit, but that will allow us to use the data in different ways."

The Aqua satellite is equipped with the same software on its platform that Terra currently carries in orbit. But because of the different times of day the satellites will orbit the Earth, the software will provide a different type of data to researchers at NASA and in Running's UM lab.

The UM software on Terra, which hits the Earth's equator at 10:30 a.m. MST each day, is land-oriented and provides scientists with data on vegetation growth rates all over the world.

Aqua, which hits the equator at 1:30 p.m. MST, is water-oriented and has UM-designed software that will provide data on drought conditions and fire danger worldwide. In order to accomplish the afternoon orbit time, Aqua was launched at 3 a.m. MST, Running says, which provides a vastly different view for observers than the late morning Terra launch.

The Terra launch in December 1999, from the same Vandenberg Air Force Base in coastal California that Aqua lifted off from earlier this year, marked the culmination of more than a decade of research for Running, a longtime UM researcher who has become an internationally renowned expert on satellite science. Terra's liftoff was delayed for years as scientists tinkered with every aspect of the $1.3 billion satellite, which was armed with five different sensors designed to monitor an array of conditions on Earth.

Aqua's liftoff also was delayed more than two years from its original launch date.

"Its original launch date was for December '99," Running says. "It slid back the same way Terra did."

But in charting new courses in satellite science, delays aren't necessarily bad.

Running says the lag time between the launch of Terra and the launch of Aqua was probably a good move scientifically. He says when pioneering research in outer space, it's always good to have a backup plan in case

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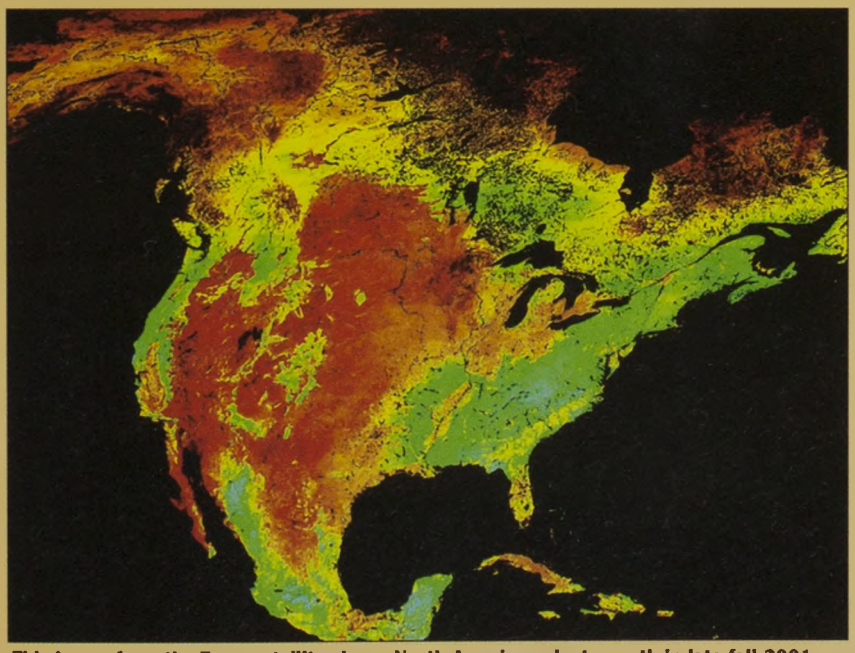
UM Satellite Study Shows Increased Plant Growth

A NASA-funded study directed by UM finds that changing rainfall patterns over much of the United States in the last century have allowed plants to grow more vigorously and absorb more carbon dioxide from the atmosphere.

In the presence of water and sunlight, plants take in carbon dioxide (CO_2) during photosynthesis to create fuel, glucose and other sugars, as well as build plant structures. Better understanding of biological and physical processes that contribute to carbon uptake by plants will help scientists predict climate change and future levels of CO_2, a heat-trapping gas in the atmosphere.

"The changes in the hydrologic cycle are a mechanism often overlooked in the recent debate over carbon sequestration in the United States," says Ramakrishna Nemani, a researcher at the UM School of Forestry and lead author of the study, which appeared in an issue of Geophysical Research Letters earlier this year.



This image from the Terra satellite shows North American plant growth in late fall 2001.

Scientists have noticed that the U.S. terrestrial sink, an effect where carbon is drained from the air and stored in the land, has been increasing since the latter part of the 20th century. Previous research has claimed this rise may be due to an observed greening of the United States as a result of forest regrowth, as well as greater concentrations of atmospheric CO_2 and warming temperatures.

For the first time, however, this study suggests that changing rainfall patterns may play a bigger role in plant growth and carbon absorption. Computer model results show that on average from 1950 to 1993 higher humidity combined with an 8 percent increase in precipitation has led to a 14 percent increase in plant growth in the United States. Data over that time period also show increases in cloud cover, minimum temperatures, soil moisture and stream flows, all of which are signs of a changing hydrologic cycle.

Whether or not shifting rainfall patterns result in a positive uptake of carbon by land ecosystems depends on complex interactions that include plant physiology and both the magnitude and timing of changes that impact the water cycle.

Between 1950 and 1993, minimum temperatures in the spring generally have become warmer and autumns generally have been wetter, which has combined to lengthen the growing season for plants. A longer growing season means plants pull carbon from the air for a greater period of time. In addition, the magnitude of precipitation on average has gone up in the conterminous United States, except over the Pacific Northwest.

"Most people only think of the idea that more water means more growth, but really plants benefit from more water in a number of ways," says Steven Running, a UM forestry professor and co-author of the study.

When the air is wetter, plants can open special cells in their leaves without losing much water to the air, increasing CO_2 uptake while reducing the amount of water needed to grow. Additionally, wetter soils promote decomposition of dead plant materials, releasing nutrients needed for plant growth. Also, higher humidity in the spring helps maintain higher night temperatures, which makes for more frost-free days and lengthens the growing season.

The authors found that without enhanced rainfall and humidity, CO_2 increases and temperature changes have a lesser effect on plant growth.

Greenhouse gases warm the air, and warmer air can hold more water, which impacts the hydrologic cycle. Changes in the cycle may mean more rainfall in some regions and less in other places, affecting plant growth and carbon absorption, which in turn affects future concentrations of greenhouse gases, Nemani says.

The study was funded by the Vegetation Ecosystem Modeling and Analysis Project and the Moderate-resolution Imaging Spectroradiometer science team, which are part of NASA's Earth Science Enterprise. V —*NASA*

something goes wrong.

"That means we've had a backup (instrument) on Earth while we've learned from Terra," Running says. "I'm very happy it stayed on the ground so we could correct some small engineering problems. And if a big meteor hit Terra, we would still have another (instrument) on the ground."

UM researchers Steve Running (left) and Ramakrishna Nemani use NASA environmental satellites to study our world.

While scientists have been pleased with the data being gleaned from Terra, Running says it is still a work in progress because of the newness of the data being received.

"It's functioning as planned," he says, "but the space environment is endlessly exciting. ... Meteors the size of a grain of sand can cause all kinds of problems. And gamma rays from the sun could just zap it out. Things just can go wrong in space. But we are getting what we wanted."

Running says his team of researchers primarily has been concentrating on monitoring daily vegetation growth rates with the Terra data.

Eventually, Running says UM should play host to a data center where regional land managers can come to make use of the Terra information and learn how to interpret it.

"It's pretty hard for somebody to just sit down and understand the data," he says. "We've got the funding for personnel for such a center, but we don't have a building to put it in. ... That would enable us to do a better job of serving the global research and earth science communities."

With Aqua, Running says his team will be able to do a better job of monitoring drought and fire conditions worldwide. He says the data gleaned from Aqua should provide scientists with the tools to develop reliable drought monitor indexes and fire danger indexes.

"We want to know what the surface temperature is all over the world," Running says. "This will enable us to do so."

Running and his team of experts aren't finished. With their software tucked away on two orbiting satellites, the UM crew now will turn its attention toward a new NASA project dubbed "Hydros."

The satellite project, still in the planning stages, would be a collaborative effort between Running's team at UM and scientists at the Jet Propulsion Laboratory in California and the prestigious Massachusetts Institute of Technology.

"There could be a whole cluster of grants surrounding this new mission," Running says. "NASA wants us to look at how we can measure the frozen areas of the Earth each day. ... If we can land it, it would be another whole launch process."

While satellite launches still excite Running, he says once he personally witnessed Terra take off, other launches seem somewhat more routine.

"No doubt we're not as nervous, and the expectations are not as extreme now that we have one that has worked," he says. "The scientific expectations are just as high, but the emotional anticipation is not as intense." V

Gary Jahrig, a UM journalism school graduate, is a freelance writer in Missoula and a frequent contributor to Vision *and* Research View.

Running Honored

To a scientist it's the equivalent of a sports figure getting inducted into the hall of fame. UM Professor Steve Running was recently inducted as a fellow of the American Geophysical Union in Washington, D.C.

Running, director of UM's NASA-affiliated Numerical Terradynamic Simulation Group, was one of 41 distinguished scientists selected for the honor this year. AGU members selected as fellows have attained an acknowledged eminence in a branch of the geophysical sciences.

AGU is the largest earth science research society in the world, with more than 38,000 members in 117 countries. The number of fellows selected annually is limited to no more than 0.1 percent of the current AGU membership. Candidates are nominated by their peers.

Helping Hospitals

UM Researchers Examine Health Care Issues in Rural Facilities

Through the National Rural Bioethics Project, a collaborative multi-state partnership located at UM-Missoula, research professors Ann Cook and Helena Hoas work to improve the quality of health care in rural settings. The professors' cutting-edge research recently earned UM a National Institutes of Health grant, which allows Cook, Hoas and others to continue research that examines the relationship between working conditions and medical errors and other adverse events that occur in rural hospitals. The grant was awarded by the NIH Agency for Health Care Research and Quality.

Researchers Helena Hoas (left) and Ann Cook help rural health care providers improve services.

Associate Professor Timothy Stratton, chair of UM's Department of Pharmacy Practice, and University of Washington Associate Professor Sarah Shannon worked with Cook and Hoas on the grant proposal that earned UM more than $1 million of the $8 million the NIH agency awarded to 20 universities.

"This research involves what has become an important issue in health care — the need to reduce medical errors and adverse events," Cook says. "To date the best approaches for reducing errors and adverse events in rural hospitals have not been identified, in part because the research needed to identify those approaches has not been conducted in rural hospitals. This is the first time that a bioethics initiative involving errors and adverse events specifically will involve hospitals in the rural West."

Previous research by Cook and Hoas led to the current NIH grant award. In 1997, through the support of the Culpeper-Rockefeller Foundation, the researchers performed studies to identify bioethics-related issues that emerge in rural health care settings. Their investigation with researchers from four other universities then continued with the support of the Greenwall Foundation. In all, nine studies were conducted encompassing 14 states.

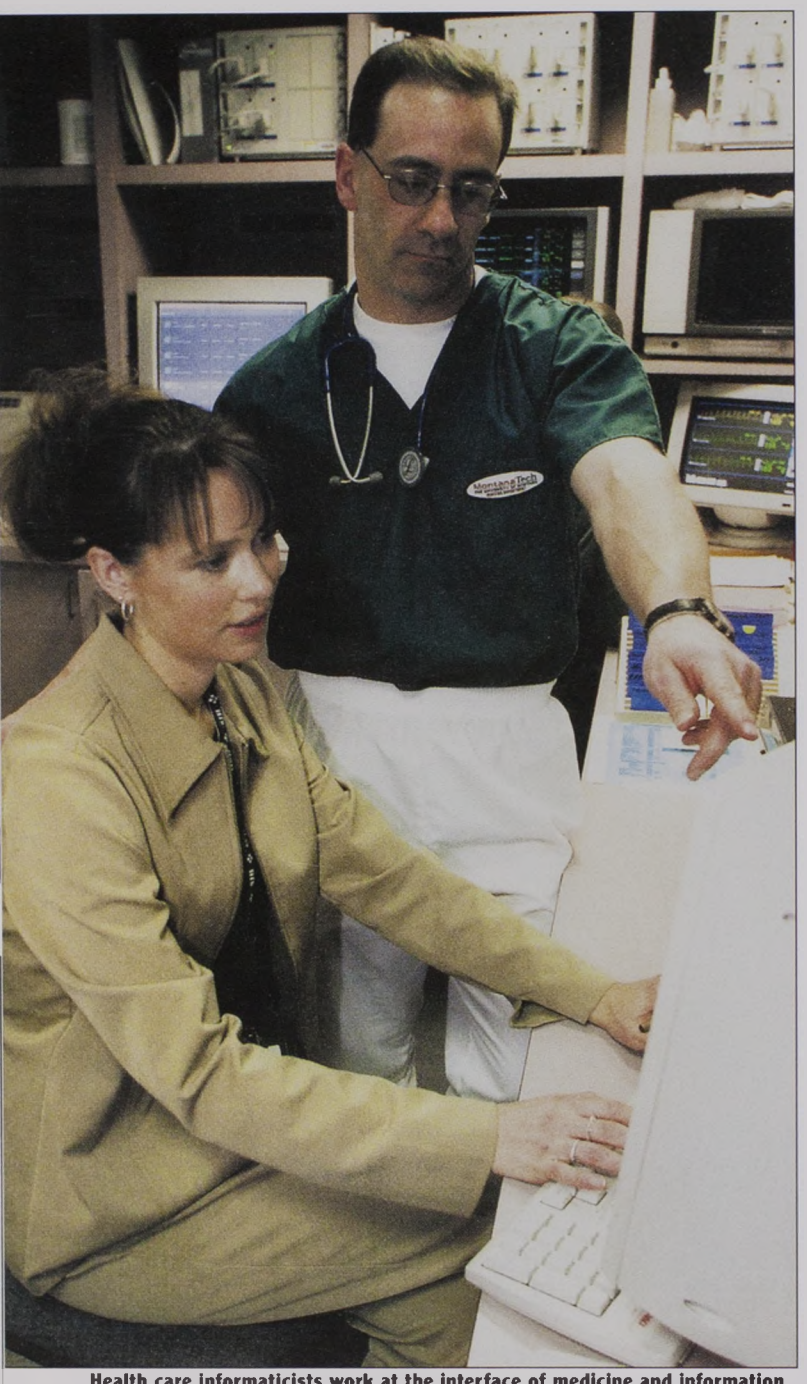
Cook and Hoas have identified numerous differences between rural and urban health care. One important difference, they say, is the relationship between the providers and their patients. In urban settings, relationships are often solely professional in nature, while in rural settings, most health care providers characterize their relationships as both personal and professional. Rural health care providers also work with limited access to continuing education or bioethics resources to help them deal with their unique circumstances.

Working with teams of physicians, nurses and pharmacists from participating rural hospitals in Montana, Wyoming, Alaska, Minnesota, North Dakota, South Dakota and Washington, the researchers will continue to examine how health care providers and residents in rural communities identify, discuss and resolve complicated ethics-related issues.

The project will help hospital personnel critically evaluate the collected data to improve their services. Researchers will focus on practices that reduce medical errors in rural hospitals and will assist with policy changes to facilitate those practices. They also will develop resources for rural health care providers, which will be broadly field-tested and disseminated with the help of collaborators from four other universities that have participated in National Rural Bioethics Project research initiatives.

"This research will give rural health care providers a voice and will help them define best practices and shape what optimal rural health care should look like," Hoas says. **V**

—Mike Santana



Health care informaticists work at the interface of medicine and information technology.

LEADING IN

UM's Montana Tech Offers Health Care Informatics Degree

by Vikki McLaughlin

Ray Rogers has never seen anything like it. In all his time as director of college relations and marketing for Montana Tech, never has he seen such interest in a new degree program.

The new program is Health Care Informatics — the nation's first such undergraduate degree — which began this fall, starting its first group of students on the road to a specialty career that merges clinical health care and information technology.

"I typically get one or two calls or e-mails every day, and that's been going on for months now," Rogers says.

Graduates of the program will be able to retrieve and interpret data to track trends, costs and other information useful to hospitals and other health care facilities. Their work will update the health care industry through the world of technology.

"The bottom line is, it will improve health care – improve both the quality and efficiency," Rogers says.

Montana Tech has partnered with Butte's St. James Healthcare in the informatics venture, which includes not only the new degree program, but also a National Center for Health Care Informatics to be built on the St. James campus.

"In time, it will have an impact on the cost of health care, which is important to everyone," says Pat Dudley, human resources director at St. James.

While the two projects are related, they're moving forward on parallel paths, Rogers says.

The center, a self-supporting, stand-alone entity, will cover about 8,000 to 10,000 square feet and house three classrooms with multimedia capabilities, as well as administrative offices. It will function as a nonprofit corporation with affiliations to both Montana Tech and St. James.

Though the two institutions will not provide funding for the center, they will provide expertise and professional skills for students and faculty to draw on.

A $400,000 federal grant was awarded to the center in April, but funds are restricted and must be reprogrammed to be spent for planning and design, Dudley says. That money should be available later this year. Meanwhile, Montana Tech and St. James have requested a congressional appropriation of $1.5 million for fiscal year 2003 to build the center and purchase hardware and software.

Dudley and Rogers say they should know about the $1.5 million request, which has the support of Montana's three congressional representatives — Sens. Conrad Burns and Max Baucus and Rep. Denny Rehberg — by the end of the year. They plan to request additional funding for fiscal year 2004 to complete the center.

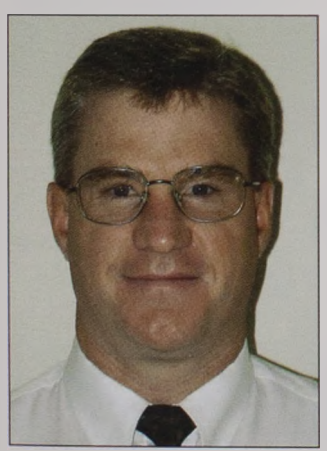
"We hope by the end of the third appropriation year that it will be able to sustain itself," Rogers says.

The center's goals, stated in the funding request submitted to Congress this year, are to establish:

- a national reference and network center for health care and information technology professionals;

FORMATION

- a continuing education resource for professionals working in rural and urban health care facilities;
- a business incubator to encourage and support development of information technology products for managing health care information;
- a corporate sponsorship program to develop internship and permanent employment opportunities for graduates;
- educational programs designed to retain qualified health care professionals through a workforce transition program;
- highly trained, skilled interns and graduates who help health-care facilities and organizations across the nation bridge the growing technology gap between clinical and information systems professionals.



Tech's Ray Rogers

The center's continuing education component is crucial, Dudley says. "The key to functioning in the IT (information technology) world is to be kept up to date.

"We also have a huge need for continuing education in health care in general. The center would have the infrastructure to provide that education through distance learning, especially to small, rural facilities with small budgets."

Dudley and Rogers, who eventually will become directors of the center, are not thinking small. They believe the facility could become a national reference and research center, drawing on the knowledge bases of Montana Tech and St. James, as well as professionals in the information systems industry.

A recent article in Nurse Week magazine discussed the health care technology need and how the industry is lagging behind in that area. In a Business and Health magazine survey of information technology specialists in hospital systems, HMOs and physician group practices, nearly two-thirds of those responding said their organizations' top priority for 2001 was the need to deploy Internet technologies. The top five priorities listed by respondents had an information technology component.

The informatics program has benefits for Montana Tech, for St. James, for Butte, for Montana and for the country, says Dudley, who initiated the project. What started out as an idea to solve the hospital's shortage of on-call, per diem workers blossomed into plans for the degree program and the national center. Dudley's original plan was to offer scholarships to Tech for health care workers who were burned out and wanted new careers. That would be good for St. James, as those students would work in the per-diem pool for the two or three years they were attending the college.

As his plan took shape, the idea of merging clinical and information systems skills began forming in Dudley's mind. He took the idea to Rogers in fall 2000, and the birth of the informatics program was on its way.

The informatics degree program, which was approved last November by the state Board of Regents, had more than 20 students accepted by mid-May.

"We're happy with that," Rogers says. "We got a late start getting the word out. ... But we've had a tremendous amount of interest."

Danette Melvin, who has been at Montana Tech for four years, was named interim department head for informatics in April. Melvin, who finished a nursing master's degree in clinical systems management, teaches nursing classes at Tech's College of Technology.

The first two years of informatics classes will be delivered mostly online, Melvin says. Other classes in the informatics curriculum, such as psychology and chemistry, already are offered at Tech through other departments.

Tech offers degree programs in health care, technology and communications fields. "We can pull from the courses we already have toward a health care informatics degree," Rogers says.

He says, however, that he wants to bring in more experts in informatics, and he hopes to have five faculty members in the program within the first few years.

Students may be straight out of high school or health care professionals seeking a career change. Health Care Informatics offers a two-year associate degree or a four-year bachelor of science degree.

Montana Tech and the center will help fund internship programs for students in their senior year and during summers. Students also will be placed in various health care sites so they can see what particular jobs are like, Melvin says.

The program could have as many as 150 students within three years. But Rogers doesn't want to proceed too fast, to ensure that quality remains high.

"It's an incredibly exciting program," he says. "The interest from the health care industry really has been exciting for us. The jobs are out there, and they're good-paying jobs. We're hitting this at a good time. The industry needs these people, and they needed them yesterday.

"Right now," Dudley says, "we're the best thing around." V

Vikki McLaughlin, a UM journalism school graduate, is a freelance writer and part-time copy editor for the Montana Standard *in Butte.*

Excellence on the Air

Montana Public Radio and PBS Enrich Montanans

by Patia Stephens

"In the public interest."

That simple phrase is to the Public Broadcasting Act what the phrase "Life, Liberty and the pursuit of Happiness" is to the Declaration of Independence, and what "We the people" is to the U.S. Constitution.

"In the public interest" is the heart and soul of the Public Broadcasting Act, a landmark federal document now celebrating its 35th anniversary. When President Lyndon B. Johnson signed the act on Nov. 7, 1967, establishing the Corporation for Public Broadcasting, he dedicated "a part of the airwaves — which belong to all the people — ... for the enlightenment of all the people."

The act, Johnson said, "announces to the world that our nation wants more than just material wealth; our nation wants more than a 'chicken in every pot.' We in America have an appetite for excellence, too.

"While we work every day to produce new goods and to create new wealth, we want most of all to enrich man's spirit," he said. "That is the purpose of this act."

A public commons under the Big Sky

In Montana, that mission is carried out to a large extent by Montana PBS and Montana Public Radio, which reach across the state's airwaves to enlighten and enrich the public with news and cultural programming. Montana PBS reaches television viewers via a broadcast signal shared by two stations — KUFM-TV in Missoula and KUSM-TV in Bozeman — while

Montana Public Radio serves western and central Montana through a network of FM stations.

KUFM-TV and Montana Public Radio are a public service of The University of Montana-Missoula. UM also is home to the Broadcast Media Center, where programs for Montana PBS and Montana Public Radio are produced by employees and students. These programs range from the TV documentaries "Backroads of Montana" and "Sun River Homestead" to radio offerings like "Montana Evening Edition" and "The Pea Green Boat."

Envisioning TV in the Last Best Place

Since its inception in 1996, KUFM-TV has worked in tandem with KUSM-TV at Montana State University-Bozeman to present Montana PBS to the viewing public. The partnership was mandated by the state Board of Regents, which realized the state's population wasn't big enough to support two separate public television stations.

"I think the fact that it's a cooperative effort between the two universities says a lot about the fact that we took a sensible approach to public television," says William Marcus, director of the Broadcast Media Center and general manager of KUFM television and radio. "You have two universities and two station staffs working together to produce one very wonderful television service."

Montana PBS reaches about 560,000 television viewers, roughly 30 percent of whom tune in at least once a week. As a local affiliate of the Public Broadcasting Service, Montana PBS exposes viewers to top national shows like "The NewsHour with Jim Lehrer," "Nova" and "Sesame Street." MSU's production unit contributes issues-oriented discussions such as "Montana Profiles" — a recent episode was titled "Mouse in the House: Hantavirus" — and live-performance broadcasts, including the "Montana Summer Symphony." KUSM-TV also handles the technical end of delivering the Montana PBS signal, freeing up KUFM-TV employees to focus more on production.

Television made in Montana

That creative freedom has led to some impressive TV shows — and some impressive awards, as well. UM graduate Maggie Carey recently won a regional Emmy for her documentary, "Sun River Homestead," which she produced in the Broadcast Media Center with the help of professional staffers John Twiggs and Ray Ekness. The program traces the lives of three sisters who came to Montana in the early 1900s.

Perennial favorite "Backroads of Montana, " which highlights the state's interesting people and places, collected its fourth Program of the Year Award from the Montana Broadcasters Association for the 16th program in the series, produced by Twiggs, Marcus and Gus Chambers. Another Chambers program, "The Bicycle Corps: America's Black Army on Wheels," won a Rocky Mountain Emmy Award for its tale of the 25th Infantry's 1897 bicycle journey from Missoula to St. Louis.

Both "The Bicycle Corps" and "Sun River Homestead" have aired on PBS stations nationwide, while UM producer Daniel Dauterive's "Making Frontier House" and "Silence and Solitude: Yellowstone's Winter Wilderness" also were distributed nationally.

Other award-winning programs produced at the Broadcast Media Center include "Remembering the Columbia Gardens," a look at the longtime Butte landmark by Ekness, and Twiggs' "How the West is Fun" series, a program for middle-schoolers. Twiggs just wrapped up another production for kids: "The Really, Really Big Floods," about Glacial Lake Missoula.

Students work in UM's Broadcast Media Center editing room.

In addition, budding broadcast journalists get their start in the Broadcast Media Center, which serves as the lab for students in UM's Department of Radio-Television. The recent student documentary, "Montana Gambling: Hold It or Fold

It?" shot on location around the state, exposed Montana PBS viewers to different perspectives on the contentious issue of gambling. The documentary was produced entirely by students under the direction of R-TV Chair Bill Knowles, who called it a cutting-edge production on a cutting-edge Montana issue.

Director Marcus aims to make Montana PBS even edgier with the creation of a new position for a producer of public affairs programming. He envisions "sort of a Montana 'Frontline.'"

"While I think we're very adept at presenting programs like 'Backroads' and historical documentaries," Marcus says, "there are a lot of present-day issues in Montana that need in-depth examination. Watching 'Backroads,' you get the feeling that everyone's happy and friendly and all of Montana is beautiful. And that's not always the case.

Larry Pirnie's artwork was used in this year's Montana Public Radio fund-raising campaign.

"I see this new position as filling out that part of what we should be doing to serve the people in the state," he says.

The sound of music and news and ...

Montana Public Radio has served the state for 37 years, longer even than the Public Broadcasting Act has been in existence. The service grew from humble beginnings as the R-TV department's student training facility into a National Public Radio and Public Radio International affiliate that serves western and central Montana. (Yellowstone Public Radio, based at MSU-Billings, serves eastern Montana.) Montana Public Radio's signal reaches about half of the state's population — among whom 10 to 15 percent are regular listeners — via KUFM in Missoula, KGPR in Great Falls, KUHM in Helena, KUKL in Kalispell, KAPC in Butte and KUFN in Hamilton.

"Radio is a huge part of what the Broadcast Media Center does for the state," Marcus says. "People use radio completely differently from television. It's much more personal, more immediate."

Listeners tune in to hear news, including NPR's "Morning Edition" and "All Things Considered," the "BBC World Service" and "National Native News." They also hear an eclectic mix of music that might not otherwise get airtime in Montana on shows like "AfroPop Worldwide" and "The Thistle and Shamrock." Other out-of-state productions include "Car Talk," with auto advice from wacky brothers Click and Clack, and the folksy variety show "A Prairie Home Companion" hosted by Garrison Keillor.

But unlike many public radio stations, half of Montana Public Radio's programs are produced locally. Montana news is covered in morning and evening editions from an award-winning team led by Sally Mauk and Edward O'Brien. Locally hosted musical programs run the gamut from "Dimensions in Jazz" and "Saturday Music Hall" to "Pazz and Jop" and "Jonkunnu Express," while shows like "The Food Guys" and "Plant Detective" inform and entertain.

"We have a commitment to presenting the best of national programs and showcasing Montana talent and expertise," Marcus says. "Some of our local jazz and blues programs rival the best in the country. And 'The Pea Green Boat' is the longest-running, regularly scheduled children's program in public radio."

Listeners respond enthusiastically to Montana Public Radio's diverse programming. During Public Radio Week, the network's annual fund-raiser, people offer homespun premiums ranging from cheesecake to live goats, which other listeners receive in exchange for their donations. A raft of telephone volunteers makes the fund-raiser a weeklong, on-air celebration. In April 2002, Public Radio Week brought in nearly $379,000 in pledges, which will support programming and equipment in the upcoming year.

But wait, there's more

Montana PBS also offers public outreach through training and assistance to teachers who use PBS programs in the classroom, as well as by providing thousands of books to Montana schoolchildren. Both programs are funded by a Corporation for Public Broadcasting grant.

When he signed the Public Broadcasting Act 35 years ago, LBJ had a vision that has been realized in Montana and across the country — a vision of a public commons on the airwaves that "aims for the best in broadcasting good music, in broadcasting exciting plays, and in broadcasting reports on the whole fascinating range of human activity. It will try to prove that what educates can also be exciting.

"It will get part of its support from our government," Johnson continued. "But it will be carefully guarded from government or from party control. It will be free, and it will be independent — and it will belong to all of our people." V

Core of Discovery

The 2003-06 bicentennial of the Lewis and Clark Expedition is fast approaching, and UM has positioned itself to be a national leader in providing information about the Corps of Discovery.

The University is deeply engaged in the upcoming national commemoration, whether having UM historian Harry Fritz discussing the expedition on the History Channel; bringing Gary Moulton, the editor of the definitive edition of the Lewis and Clark journals, to campus as a guest lecturer; or training teachers to use NASA satellites to study the corps' trail. UM even markets itself with a slogan that harks back to Lewis and Clark: "The Discovery Continues."

Whether you see Lewis and Clark as bold American adventurers or the vanguard of unheralded change, UM offers information and dialogue about the expedition from a variety of different viewpoints.

Following are just a few ways UM contributes to our knowledge of Lewis and Clark.

Lewis and Clark on the Web

One of the best places to learn more about the historic travelers is the "Discovering Lewis and Clark" Web site, located online at www.lewis-clark.org. The dynamic and ever-changing Web site is produced by former UM Professor Joe Mussulman. Interpretive episodes that explore some aspect of the expedition are added periodically.

"Discovering Lewis and Clark" includes more than 1,200 pages and gets 27,000 hits a day. The site has been described by historians as the best source of Lewis and Clark information on the Internet.

The Web site, online since 1997, is funded by a nonprofit corporation Mussulman created called VIAs. Look for new episodes at the site for several years to come. Fiscal management of the site is provided by The Bookstore at UM.

From East to West to the Stars

UM's Earth Observing System Education Project trains teachers to study the Lewis and Clark Trail with advanced technologies. The project's summer institutes let educators explore the historical and contemporary landscape of the trail and develop new educational and interpretive concepts for the upcoming bicentennial.

Participants delve into Lewis and Clark educational curricula, interpret characteristics of the trail, use advanced data visualization, analyze the Corps of Discovery route with global positioning systems and geographic information systems, and join in interpretive field tours.

UM's EOS Education Project is a NASA-funded organization that disseminates Earth science imagery and curricula to the global educational community — especially information from NASA's Earth Observing System of environmental satellites.

First Americans' First Impressions

The Corps of Discovery encountered many American Indian tribes on its epic journey, and UM will become a leader in examining Lewis and Clark from the perspective of the West's original inhabitants when it hosts "A Confluence of Cultures: Native Americans and the Expedition of Lewis and Clark" on May 28-31, 2003.

The entire length of the Corps of Discovery's journey was in Indian Country. On many occasions Lewis and Clark's survival and success depended on Indian people and shared cultural lessons.

The event will encourage scholarship about native cultures at the time of the expedition and examine the changes that have occurred over the last two centuries. Participation is being sought from both Indian and Euro-American researchers to spark a dynamic exchange of new thought on how each culture views (and viewed) the expedition and how the coming together of cultures has changed the environment, cultural traditions, lifestyles and the United States itself. V

—Cary Shimek

Animal Advocate

Veterinarian is Vital Voice for Humane Research

by Gary Jahrig

Don't confuse Dr. John Weyhrich with Dr. John Dolittle. Dolittle, of movie and children's literature fame, talks to the animals. Weyhrich, the director of Laboratory Animal Resources at The University of Montana, talks for the animals.

"I'm a veterinarian. I love animals. But I also believe in the merits of well-conducted biomedical research," Weyhrich says. "My job is a dual role. I'm both an animal advocate, as well as an intermediary between researchers and animals.

"If I'm doing my job right. ... Hopefully through the process we will come up with a research method that will be satisfactory to all: the researcher, the regulators and anyone else in between."

Weyhrich's job entails overseeing the operation of UM's animal research lab, which is tucked away in the basements of two buildings on the Missoula campus. Home to a variety of mice, rats, fish, birds, monkeys, sheep and other species, the animal research lab provides a testing ground for researchers from academic disciplines such as biological sciences, pharmaceutical sciences, pharmacy and psychology.

"The makeup changes frequently, depending on the research being conducted," Weyhrich says.

Access to the buildings is strictly monitored, and visitors must follow health guidelines when entering the lab. Some animals carry contagious viruses, and others are highly susceptible to human diseases.

Animal research, while deplored by some as unethical and inhumane, is considered a vital component of academic life by scientists who spend their working hours trying to find cures and antidotes for an array of human diseases ranging from the common cold to diabetes to cancer — in an ethical and humane manner.

A quality animal laboratory is viewed as essential by researchers in most scientific fields.

"I wouldn't have been able to move here without a good animal facility," says Andrij Holian, a nationally known pharmaceutical sciences professor who came to UM more than a year ago to head the school's newly created Center for Environmental Health Sciences. "I had to check out the facility before I agreed to come here," he says.

"It's a critical, vital aspect to any university that wants to do cutting-edge biomedical research. In order to study human diseases, you have two choices. You can work on humans or work on animals as

Dr. John Weyhrich manages UM's animal research facilities.

surrogates for humans. ... The bottom line of all biomedical research is to understand the mechanisms of the disease — initiation and progression and genetic base for disease susceptibility."

UM President George Dennison lauds the lab and the research it supports.

"They take a great deal of pride in following the code of ethics," Dennison says. "And students benefit both directly and indirectly from the research. ... Research attracts grant money that buys equipment that is used by students. We've got world-class research going on in there.

"I'm proud that we are fully accredited and doing the work we are doing here at UM."

The current resident list in the facility is dominated by rodents — rats and mice. "Most biomedical research takes place using mouse or rat models," says Holian, who uses a special breed of genetically raised mice to study lung fibrosis and asthma.

Mice of a variety of sizes and large white lab rats are housed in several of the animal lab's research rooms. Researchers such as Holian have their own private areas where their specimens are housed in specially designed cages.

Research projects involving rats and mice include studies looking into respiratory diseases, neurological disorders, reproductive systems, cancer and HIV.

Projects involving other animals currently under way in the Animal Research Lab include:

- A study of rhesus monkeys by psychology faculty members that uses video games to monitor the learning process of the primates;
- The use of sheep and rabbits by scientists from UM and St. Patrick Hospital to experiment with new heart surgery procedures;
- Studies of worms to help determine the parasitic cause of whirling disease.

The lab's newest addition is a surgical area, complete with heated cages and a $40,000 microscope, where animals with diseases or other problems can be treated.

While Weyhrich oversees all laboratory research at UM, he is quick to give credit to his staff of three caretakers and a surgical specialist for the day-to-day operations of the lab.

"The caretakers are the unsung heroes of the lab," Weyhrich says. "They're responsible for the daily care of the animals. They provide food and bedding and make sure the cages are clean. It's kind of a thankless job. But the work the animal care staff does can have a great impact on research.

"They are kind of like the linemen of the football world. They're in the trenches doing work that isn't so glamorous."

When talking of the world of animal research, Weyhrich repeatedly brings up the subject of regulations.

"We in the animal research world are very heavily regulated. We have reams and reams of federal regulations, as well as state and university policies, to follow," he says. "Every institution that receives public funding needs to have in place at the university a system that not only reviews and approves any work utilizing animals, but also a process where animals are provided with the necessary care and husbandry that will allow the animals to be well-kept.

"That's why we are so heavily regulated. We have people in place here, like myself and the animal care staff, to ensure that research done is conducted in a humane, dignified and scientific manner."

All research projects involving animals must first be cleared by the Institutional Animal Care and Use Committee, composed of UM faculty members, a veterinarian and a member of the community at large who is not affiliated with UM. The committee has full jurisdiction over the animal care program, Weyhrich says.

"It makes sure we adhere to rules and regulations," he says. "And to avoid a conflict of interest, (the committee) is headed up by someone other than me."

Twice a year the committee is obligated to inspect the lab and review the entire animal care program. The group meets four times a year on a formal basis, but Weyhrich says informal meetings to discuss animal care issues take place often on a weekly basis.

Researchers seeking approval to conduct experiments on animals must show first and foremost, Weyhrich says, that pain and suffering have either been eliminated or mitigated.

Animals used in research also must be provided with the proper exercise and diet to ensure they are in top condition.

"An animal in pain or distress or that has a disease does not make for a good animal model," Weyhrich adds.

And while he admits there are people who condemn the use of animals for any type of research, Weyhrich believes the majority of the general public understand the scientific rewards that can be reaped from the study of animals.

"Most people believe there are tangible benefits to our activities. Almost anyone out there will have a relative or friend who is alive today because of some type of animal research. Animal research can be highly beneficial to both human beings and animals." V

Breathing Easier

UM Professor Researches Respiratory Problems

by Gary Jahrig

Andrij Holian, a UM pharmaceutical sciences professor and the director of the school's Center for Environmental Health Sciences, found his way back to Montana nearly a quarter of a century after earning his doctorate in Big Sky Country.

"I always thought I might come back to Montana," says Holian, who earned a doctoral degree at MSU in 1975. "But I knew if I was going to come back, it would have to be for the right reasons under the right conditions."

Those reasons and conditions surfaced in fall 1999 when UM's School of Pharmacy and Allied Health Sciences lured Holian away from the University of Texas-Houston with an offer to become the director of a newly created center to study environmental impacts on human health.

Holian says the chance to come back to Montana, combined with the opportunity to lead UM into a new field of study, led to his decision to accept the offer to come to Missoula after spending 16 years at the University of Texas-Houston Health Science Center.

"It was either stay at the University of Texas for a lot longer or start looking," Holian says. "But it was very clear the University of Texas didn't have environmental health as a focus.

"I looked at Yale, and I looked here. I felt this university would be very supportive and wanted to see this new program become a major focus for the University."

UM officials are more than happy that Holian, who also holds a bachelor of science degree in chemistry from Bowling Green University in Ohio and did postdoctoral work for four years at the University of Pennsylvania, decided to bring his expertise back to Montana.

Not only did UM gain a valued faculty member, it also inherited a ready-made program.

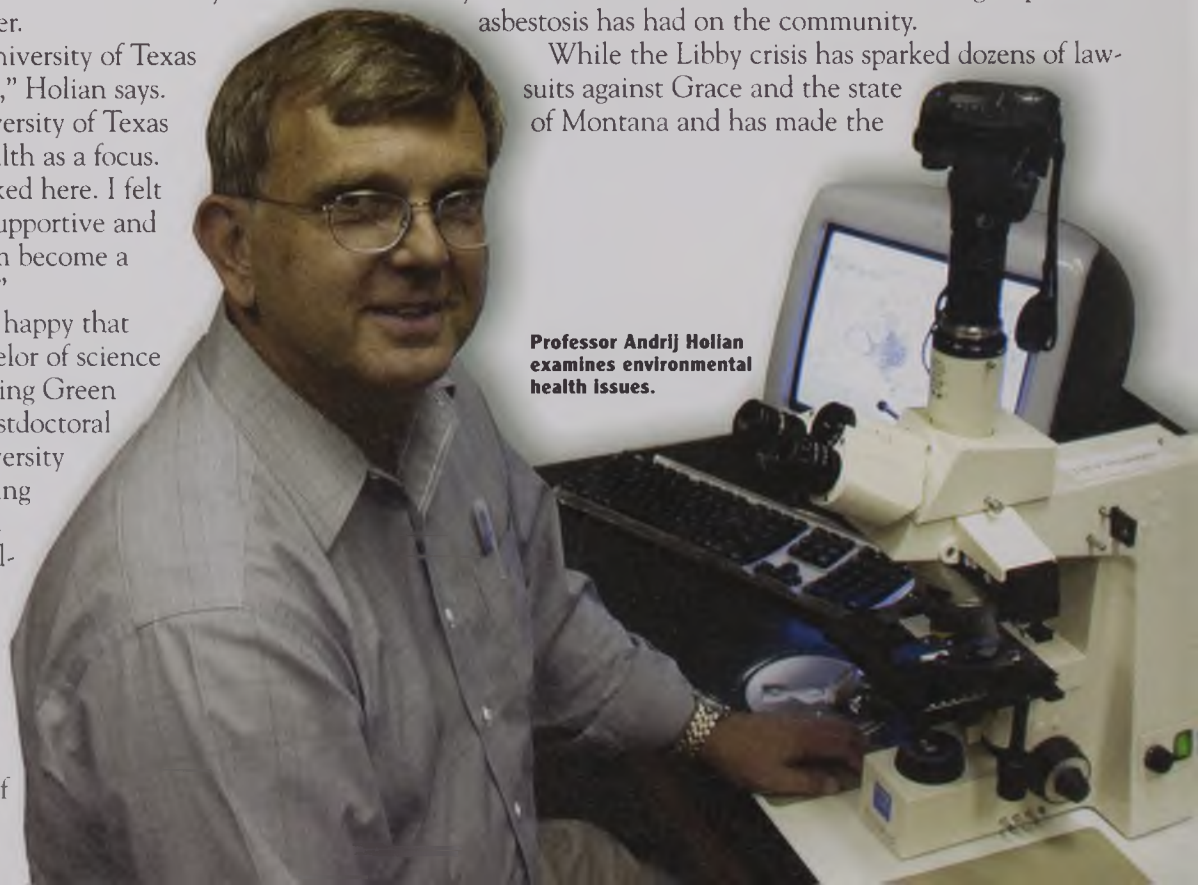
"He had tons and tons of experience and tons and tons of connections," says Dave Forbes, dean of UM's School of Pharmacy and Allied Health Sciences. "He basically brought his own lab with him. He literally brought in a ready-to-go research program."

Some of Holian's early work at UM has helped place the University at the forefront of timely studies into the effects of decades of exposure to asbestos on the residents of the northwestern Montana town of Libby, which has drawn national attention since the story surfaced in recent years.

Through 30 years of vermiculite mining at the now defunct W.R. Grace and Co. mine, Libby residents repeatedly were exposed to asbestos, which causes respiratory diseases such as asbestosis, a crippling, deadly disease that attacks the lungs and causes breathing difficulties. The airborne asbestos-laden dust poisoned soils in Libby and caused the deaths of hundreds of residents who were exposed to the particles.

Holian's background in environmental toxicology made him the perfect candidate to spearhead UM's efforts to help Libby residents better understand the devastating impact asbestosis has had on the community.

While the Libby crisis has sparked dozens of lawsuits against Grace and the state of Montana and has made the



Professor Andrij Holian examines environmental health issues.

Missoulian photo by Michael Gallacher.

Downtown Libby, where Holian's research has focused on respiratory illnesses linked to asbestos-laden dust.

town a focal point for the U.S Environmental Protection Agency, it also has proven to be a vital testing ground for Holian's ongoing research into respiratory diseases such as lung fibrosis.

"Lung fibrosis is a disease in which the overall lung tissue becomes thickened and less elastic," Holian explains. "Asbestosis is a kind of lung fibrosis. There are no cures for lung fibrosis because we don't really understand chronic lung diseases."

Armed with some $3 million in federal grants, Holian is leading a team of UM scientists who employ a variety of research techniques to try to crack the mystery surrounding asbestosis and other respiratory ailments.

Holian's team has brought Libby residents to UM for testing that includes taking blood and lung cell samples. A control group of non-Libby residents also is being tested so that samples can be compared.

"Bringing people down helps, but it doesn't tell the whole story," Holian says.

He believes that additional insight into the disease may be found in UM's Animal Research Laboratory, where researchers are looking at how asbestosis affects mice. "We are putting asbestos and silica particles into mice through their tracheas or lungs," Holian says. "Then we monitor them over time and study how the disease affects them."

To date, Holian says his research has made some headway into better understanding lung fibrosis. He says that foreign particles have an effect on a cell within the lungs called the alveolar macrophage, which triggers a reaction in the body's immune system.

"We need to continue to study how those particles interact with that cell so we can learn how to block what they're doing," Holian says.

Holian's work at the Center for Environmental Health Sciences also has focused on asthma, a common, yet serious, respiratory ailment that causes breathing difficulties.

Also through the use of lab mice, Holian is trying to determine how airborne particles exacerbate asthmatic conditions. One of the tests under way in his UM lab involves collecting air samples from Missoula and comparing them with samples taken in cities such as Boston and Houston.

"We put the mice into different groups and expose them to the particles gathered in different places," he says. "That gives us an idea if there are differences in particles from around the country. We put the mice into the different chambers and look at how it impacts their breathing."

For Forbes at the pharmacy school, the timely research being conducted in the new Center for Environmental Health Sciences is only one of the positive benefits that have surfaced since Holian arrived at UM.

Right off the bat, Holian was instrumental in securing more than $3 million in federal grants that helped pay the salaries of three more faculty members.

"He's so well connected to federal funding," Forbes says. "He knows of grant opportunities before they're even announced."

Forbes also is quick to point out that Holian has been anything but territorial when it comes to his research – gladly embracing and involving other UM faculty members in the studies.

"For me as dean, one of the most important benefits he has brought to campus is that he is very inclusive," Forbes says. "He's worked hard to bring others into his program."

That includes not only other pharmacy school faculty members, but also professors and researchers from other disciplines on campus. Forbes says that is the true measure of how successful a center is on any campus.

"For the most part on campus, we have programs, departments, schools and colleges. But a center is a conglomerate of people from all different units. A center should be like a true umbrella on campus. And that is what the Center for Environmental Health Sciences is turning out to be." V

For more information on Holian's asbestos research e-mail aholian@selway.umt.edu.

KEEP TOBACCO SACRED

Salish Healer Joins UM Tobacco-Abuse Prevention Project

Danny Vollin, a former smoker who 22 years ago struggled to quit puffing three to four packs a day, now spends his time in American Indian reservation high schools praising tobacco.

Vollin, a Salish traditional healer, believes that ignorance of the sacred powers of tobacco is responsible for the widespread increase of tobacco abuse among American Indians. "When you say that tobacco is sacred but you don't explain it, you almost give people an excuse to smoke," he says.

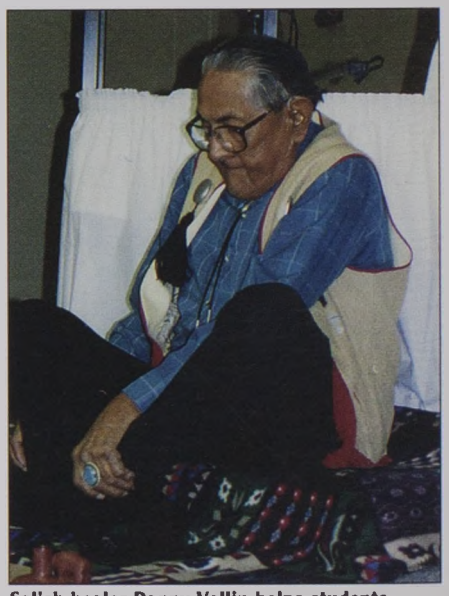
Bernadette Bannister, director of UM's Resource Center for Technical Assistance and Training, says the "Many Voices" project makes a difference through awareness.

Vollin works with the "Many Voices One Message — Keep Tobacco Sacred" tobacco-abuse prevention project coordinated by UM's Resource Center for Technical Assistance and Training. "Many Voices" began as a tobacco-abuse prevention conference organized by the Montana Department of Public Health and Human Services and has evolved into a three-year project — thanks to a $175,000 annual grant from the American Legacy Foundation.

Bringing anti-tobacco messages to American Indian communities, where tobacco has long been used in religious rituals, poses a unique challenge — one that requires cultural relevance and historical perspective.

The "Many Voices" project hopes to meet that challenge by asking Vollin and other tribal members to share information about the sacred role of tobacco in American Indian cultures with this message: The tobacco plant, a symbol of tradition, should be revered, not abused for recreational purposes.

The gains achieved so far in this campaign are the result of the collaboration of tribal leaders who are involved in developing the project. "We give them the tools, and they tailor them to their specific needs," says Bernadette Bannister, director of the resource center. "Because of their high-level participation in the project, 'Many Voices' has been successful in getting culturally relevant tobacco-abuse prevention information to American Indian populations."



Salish healer Danny Vollin helps students understand the sacred role of tobacco in American Indian culture.

The center conducts training seminars that help participants develop effective campaigns aimed at preventing tobacco abuse. A June seminar in Polson featured prayer ceremonies and guest speakers who talked about the historical roles of tobacco in their tribes. The seminar's keynote speaker, Clayton Small, an expert on American Indian health issues from Albuquerque, N.M., says studies and surveys that show American Indian communities as the most economically depressed in the nation and cast Native Americans as victims have created a sense of hopelessness that makes it hard for individuals to resist self-destructive habits such as smoking.

Presently Vollin is the only full-time speaker who reaches reservation communities at the grass-roots level through the "Many Voices" project. Bannister says limited funding hampers plans to expand this and other critical phases of the project. But even with limited funding, Bannister and her team are confident they are making a difference with the "Many Voices" project by employing their most formidable weapon — awareness. Small agrees: "However Herculean the task may seem, educating the population is the key to winning this fight." V

—Elias Okach

Hot Topic

UM Fosters Informal Diplomacy on Climate Change

Fifty high-level scientists and dignitaries from Pacific Rim countries gathered to tackle the hot issue of global warming June 26-29 during UM's Fifth Mansfield Pacific Retreat, titled "Melting Mountains: Climate Change in the Asia-Pacific Region." Participants were from China, Korea, Japan and the United States.

Held at venues in and around Bigfork and Glacier National Park, the event allowed attendees to learn about and discuss the contentious international issue in a relaxed, informal setting. The retreat was organized by UM's Maureen and Mike Mansfield Center and the Washington, D.C.-based Mansfield Center for Pacific Affairs, which both work to improve relations between Asia and America.

Retreat participants listen to a talk in Glacier National Park.

Participants saw the effects of global warming firsthand in Glacier National Park on Going-to-the-Sun Road. "We were given a very graphic presentation about how much the glaciers have shrunk," says Joanna Shelton, interim director of the UM center. "Climate change affects everyone on Earth. It's hard to imagine a more important topic."

The high-profile guests included the Chinese and Korean ambassadors to the United States, as well as Jiang Zehui, the president of the Chinese Academy of Forestry and sister of Chinese President Jiang Zemin.

People also witnessed presentations by some of the world's leading global-change scientists, such as Charles Keeling of the Scripps Institution of Oceanography, Tom Wigley of the U.S. National Center for Atmospheric Research and UM's own Steve Running, whose department has designed software for NASA environmental satellites.

Keeling pioneered the discovery that carbon dioxide levels in the atmosphere are increasing, creating the potential for global warming. "This issue isn't about the next 100 years but the next 1,000," Keeling said. "We need to look at the ultimate picture: Where is this going in the long run? We are carrying on a grand geophysical experiment – one that is irreversible, as far as the human race is concerned, for a very long time."

Wigley expects the climate to change faster in coming years. He says an enormous technological challenge facing mankind is to develop energy not dependent on fossil fuels. But that leads to another challenge: "How do you save the planet without destroying the economy?"

Phil West, UM Mansfield Professor of Modern Asian Affairs, chats with Yang Jiechi, Chinese ambassador to the United States.

Other retreat speakers were from government agencies, environmental groups and even the forest-products industry. Informal debate was encouraged between presentations, with headsets to provide language translation for those who needed it. Participants mulled over a variety of possible strategies to reduce greenhouse-gas emissions, as well as thornier issues, such as should developing countries that bear little historical responsibility for climate change be required to reduce emissions as much as developed nations?

One speaker was Elliot Diringer of the Pew Center on Global Climate Change, a former deputy press secretary to President Bill Clinton.

Diringer said, "In bringing us together here, the Mansfield Center has provided a very unusual opportunity to explore the ways in which our unique interests intersect, the ways in which they collide and, hopefully, the ways in which they might one day converge. I believe this is a fragile moment. It is clearer than ever that by addressing climate change we can help ensure a more sustainable future for all people."

The 1996 and 1998 Mansfield Retreats also were held in western Montana. The 1997 retreat was in Beijing, and the 2000 event took place in Kumamoto Prefecture, Japan. Planners intend to hold the 2003 retreat, tentatively slated to address the topic of economics and the environment, in Korea. V

— Cary Shimek

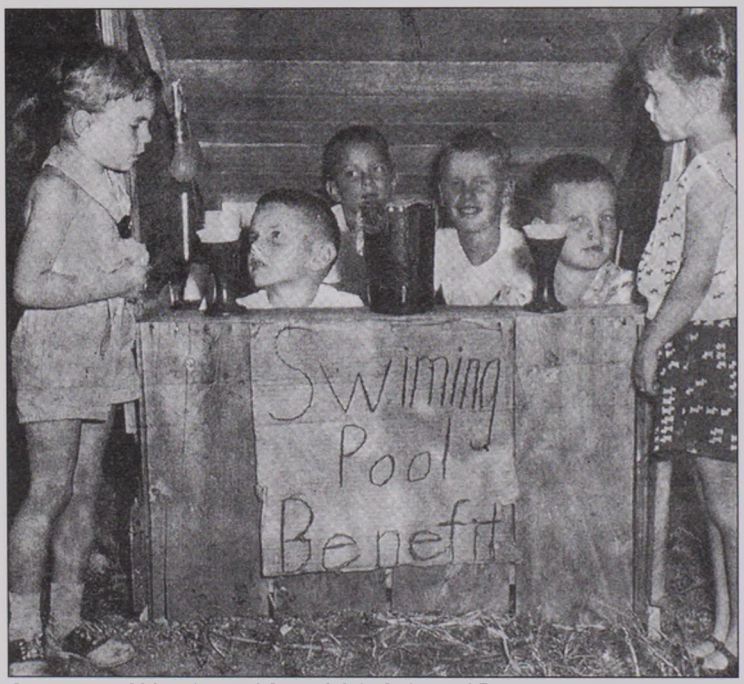
Cool Idea

College of Technology Explores Hydrogen Potential

by Patia Stephens

The black-and-white photograph of a handful of children gathered around a lemonade stand looks straight out of "The Little Rascals." Four young boys in flat-top haircuts run the wooden stand — which bears a sign announcing "Swiming Pool Benefit" — while two older sisters look on.

One of the boys behind the stand is R. Paul Williamson, now dean of The University of Montana College of Technology. It is with the story of this old photograph that Williamson opens his PowerPoint presentation on the potential for Montana to lead what he calls the "hydrogen energy revolution."



As a 7-year-old boy (second from right), College of Technology Dean R. Paul Williamson set out to raise enough money for a public swimming pool in his hometown of De Smet, S.D.

The lemonade stand grew out of the 7-year-old Williamson's dream of having a place to swim in his hometown of De Smet, S.D. He and his buddies raised seven dollars and 75 cents, and when Williamson turned the money over to his father, who sat on the city council, a swimming pool fund had to be started.

Williamson was a freshman in college when De Smet got its swimming pool.

Fast-forward a few decades to August 2002 on the COT campus, where some 90 people have gathered to learn more about hydrogen power and the dean's ideas for harnessing it to turn around Montana's sagging economy.

"I want to build the first hydrogen-powered campus in the world here in Missoula," he tells the audience. "I'm thinking if we can make it work in Missoula, there's no reason we can't make it work across the state of Montana."

Williamson says the state is poised to become a leader in the production of hydrogen energy and technologies, creating jobs and revenues while developing an environmentally friendly source of power. Hydrogen, he says, is the fuel of the very near future, and he points to hydrogen-related research, development and planning under way in other states and countries.

"Montana is uniquely situated at a critical point in time to become a key hydrogen energy producer," he says. "No other state has all the natural resources needed to meet the hydrogen challenge. We have a great opportunity to be a leader in the hydrogen revolution."

The simplest, most abundant element in the universe, hydrogen most often is found in combination with oxygen as water (H_2O) or in hydrocarbon organic compounds such as natural gas. When hydrogen is separated from oxygen or hydrocarbons into either a liquid or a gas, it seeks only to reunite, an electrochemical process that creates water and heat energy as byproducts. Hydrogen fuel cells, which facilitate this process, currently power the space shuttle, buildings and prototype automobiles made by General Motors Corp., BMW and others.

Williamson's presentation bursts at least one bubble: Hydrogen no longer is implicated in the 1937 Hindenburg airship disaster. Rather, a former NASA scientist discovered in the late 1990s that the paint used to coat the Hindenburg's skin was made from the same explosive compound used in rocket fuel. In a recent PBS documentary, the scientist alleges a Nazi cover-up of the truth.

Williamson sees nonpolluting hydrogen-powered snowmobiles as just one potential use that brings benefits to Montana — not to mention calm to Yellowstone National

Park. He envisions a statewide network of businesses that produce hydrogen and hydrogen-related products ranging from fuel cells to appliances. Hydrogen production could draw clean, high-tech industry and associated high-paying jobs to the state, he says, while creating value-added potential for Montana's natural resources.

"Hydrogen is the currency of the future," he says. "Business and job creation is vital to anything we do in this state."

Hydrogen-powered schools, he believes, have the potential to put Montana's education budget back in the black. Hydrogen's ability to harness solar and wind power could even save family farms, he says. Indeed, many experts see hydrogen as the bridge that will help the world transition from nonrenewable to renewable sources of energy.

Williamson displays a model of the proposed H_2 Futures Park.

The U.S. Department of Energy has extensive hydrogen information on its Web site (http://www.eren.doe.gov/RE/hydrogen.html), including the results of a National Hydrogen Vision Meeting held in November 2001 in Washington, D.C., where dozens of high-level representatives gathered to identify the potential for a future hydrogen economy.

"Some experts think that hydrogen will form the basic energy infrastructure that will power future societies, replacing today's natural gas, oil, coal and electricity infrastructures," states the DOE Web site. "They see a new hydrogen economy to replace our current energy economies, although that vision probably won't happen until far in the future."

Williamson thinks the time is ripe for Montana to establish itself as a forerunner in the hydrogen energy revolution. Other states, including California, Hawaii and Michigan, already have established state hydrogen plans. The dean would like to see Montana take the lead by moving quickly.

"The tendency is to just look at the here and now," he says. "But we also have to have a foot in the future."

In several months of research, Williamson has made contacts in U.S. government and in the budding hydrogen industry who confirm that his idea is a workable one. Montana's natural resources of oil, gas, coal, wind, biomass, water, solar energy, carbon and platinum make the state a natural for hydrogen production, he says.

The first step, Williamson says, is for Montanans to become educated and excited about hydrogen's potential. He's also kicked off the Montana Futures Coalition, a group open to state political, educational and community leaders who want to foster a statewide production system for hydrogen and related products. He envisions creation of the Montana Energy Products Network and establishment of an "H_2 Futures Park" at the college, which would train the high-tech workforce needed for hydrogen development.

"Keys to our success must include leadership, innovation, collaboration, proactive education and the creation of funding streams," he says. "New thinking and new skills will pave the way for extensive business and job development."

Williamson concludes his presentation with "the rest of the story" about his youthful experience in turning lemons into lemonade. De Smet's swimming pool soon was joined by a new golf course, new housing and other developments. And it all started, he says, with seven dollars and 75 cents — and the belief that anything was possible. V

For more information, visit the College of Technology Web site at www.cte.umt.edu *or call (406) 243-7852.*

DNA Discoveries

UM Junior Amanda Ng Explores B. burgdorferi

by Patia Stephens

With short brown hair falling over her eyes, Amanda Ng looks like a typical University of Montana junior, clad in jeans, fleece vest and Birkenstocks. She's friendly and easygoing, blushes charmingly when she's not sure of an answer, and punctuates her sentences with "like."

But the 20-year-old demonstrates a familiarity with words and concepts unknown to many two and three times her age, such as *Borrelia burgdorferi* and fluoroquinolones. As a paid researcher in Associate Professor Scott Samuels' molecular biology lab, Ng (pronounced "Nung") conducts experiments with Samuels' bacterium of choice, *B. burgdorferi*, which is the culprit in Lyme disease.

The Samuels lab, located in UM's Science Complex, also belies the sophisticated research taking place within. Glass beakers and scientific equipment share space with quirky refrigerator art. Windows look out onto Mount Sentinel, and a reggae CD in the stereo livens up the steps of the handful of women and men who work in the lab.

"It's really fun," Ng says. "It's better than my old job," which was handing out change at a laundromat.

A 2000 graduate of Bozeman High School, Ng began working in the molecular biology lab in October 2001, parlaying her smarts and skills into a steady paycheck last spring.

She currently holds a prestigious fellowship from Project IBS-CORE, a UM research program formally known as Integrated Biological Science Courses Organized Around Research Experience. Project IBS-CORE is funded by the Howard Hughes Medical Institute. Ng also is paid through a grant Samuels received from the National Science Foundation Research Experiences for Undergraduates program.

"I knew Amanda was going to be good," Samuels says. "Of all the undergrads I've worked with, she is the most naturally talented researcher. She's very bright and very careful, and she's just delightful."

Samuels has been exploring the inner workings of *B. burgdorferi* for nearly 12 years, initially at Rocky Mountain Laboratories in Hamilton, and at UM for the past seven years. All but one of his previous 14 undergraduate researchers have gone on to graduate school, medical school or a research career.

B. burgdorferi is somewhat unique among bacteria in that it is one of the few that has a linear, rather than circular, chromosome. This finding piqued Samuels' interest.

"Initially, our questions had to do with, how does *Borrelia* deal with having

linear DNA?" Samuels says. "How does it duplicate that genetic information and pass it on to its offspring?

"More recently, we've been looking at how *Borrelia* knows where it is and how it responds to that environment," he continued. "For example, when a tick is feeding, *Borrelia* senses the tick's change in body temperature and 'knows,' on a molecular level, that it's time to move into the mammal. We want to understand how those certain genes are turned on and off."

Ng has worked on two significant projects during her time in the lab. In the first, she extracted DNA from *B. burgdorferi* that had been treated with a class of antibiotics called fluoroquinolones. (Cipro, used to treat anthrax, is perhaps the best-known fluoroquinolone.) Her project sought to uncover how the linear DNA would react to the antibiotics.

The learning process fascinates the young researcher.

"I used a lot of different techniques that I didn't know before," Ng says. "Every time I learn a new technique, I learn something about biology that's bigger than just the technique."

Describing herself as the analytical type, Ng enjoys the intellectual challenges posed by molecular biology.

"I just like thinking about it," she says. "It's so complex. I need something concrete to think about."

In August, Ng wrapped up a project that focused on finding an alternative to a recently discontinued medium that was used for growing, or plating, bacteria in petri dishes. This nutrient-rich "broth" supplies protein and other nutrients necessary for optimal bacterial growth. A liquid plating medium remains commercially available, but a solid medium is required for certain experiments. Ng's project searched for an alternative.

"My experiment was to test the capabilities of different substitute ingredients," she says. "I'd grow up colonies of

different strains of *B. burgdorferi* and measure how concentrated the bugs were in the tube, and put the same amount on each medium. Then I'd just wait for them to grow and compare how fast colonies appear and how many colonies there were."

Ng is the middle child in a family headed by parents David and Rita Ng of Bozeman — neither of whom are scientists. She came to UM initially declaring a pre-psychology major with the vague idea that she wanted to do research. In her second semester, however, she changed her major to human biology.

"I never would have picked thinking about molecular biology as interesting," she says, "but it really is. It took me doing it to realize how interesting it is."

Having finished her second year at UM, Ng cites an honors course called "Plague" as her favorite class so far. The class, taught by St. Patrick Hospital's Dr. Herbert Swick, took a multidisciplinary approach to studying various diseases. Ng says the class was thought-provoking.

"We in the U.S. don't even think about infectious disease all the time because we have antibiotics," she says, "but with antibiotic resistance showing up, like with [tuberculosis], it's becoming a problem for the U.S. We're not insulated anymore."

Ng, who counts hiking, backpacking and running among her passions, currently is taking a year off from science to pursue another goal: becoming fluent in Chinese. Having taken two years of Chinese at UM, she left Sept. 1 for Tsinghua University in Beijing, where she will spend the next year taking language classes.

"I really want to learn a second language," she says. "I want to learn as much language as possible."

Already a world traveler with trips to Australia, Mexico and the Philippines under her belt, Ng planned the journey with the help of Davidson Honors College Dean Jerry Fetz.

"I'm really excited," she says on what was her last day in the Samuels lab for at least a year. "I think you're missing out if you don't travel and experience things."

She plans to return to UM and to the lab, however, and likely will immerse herself in the tough classes that will carry her to her ultimate goal of earning a doctorate and securing a research job that gives her "something concrete to think about." **V**

For more information on B. burgdorferi *research visit Scott Samuels' Web site at* biology.dbs.umt.edu/dbs/samuels.htm.

SHAPE UP

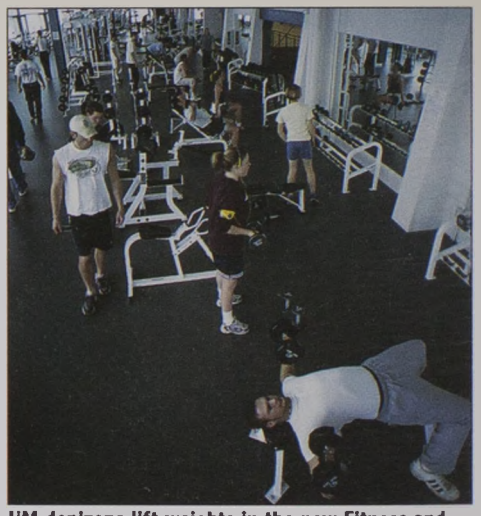
by Brenda Day

Thirty minutes a day. That's all the time it takes for inactive people in this nation to make a marked improvement on overall public health.

Yes, once again we are talking about physical activity — exercise. But we are not talking about paying high prices to join health clubs, completing daily grueling exercise routines or competing with the jocks. And we're not talking about having to buy special expensive equipment. So please read on.

Recent research by the Centers for Disease Control and the American College of Sports Medicine shows that just taking a brisk 30-minute daily walk most days of the week will give sedentary people more health benefits than those that can be gained by current exercisers who increase their physical activity, says UM Professor Emeritus Brian Sharkey. And, he adds, statistics from the CDC show that 250,000 lives are lost annually in the United States because of a lack of physical activity. The payoff for adding those daily walks to your schedule is high, and fitness experts like Sharkey are trying to get the message out.

A physiologist, author and past president of the American College of Sports Medicine, Sharkey does research at UM's performance lab to help the U.S. Forest Service minimize health risks for firefighters. He says physical activity has always been an important part of his life. Because rheumatic fever kept him in bed for months at a time as a youth, he learned early to appreciate the ability to get up and move around.



UM denizens lift weights in the new Fitness and Recreation Center.

"You know, people don't have to join a club to walk," he says. "And why would anybody walk inside on a day when they can go outside? Why be confined when you can do something outside, in a natural setting, particularly in Montana where you can walk along streams, climb hills?"

While Sharkey doesn't claim to have an answer about what will motivate sedentary people to get up and move, he does have some ideas about ways individuals, families and communities can comfortably make the transition to more active lives.

"The key is to find something you like to do," he says. "There are lots of fallacies about exercise. One is that it has to hurt to be good. It doesn't have

to hurt to be good. It can be as simple as starting to walk."

Begin walking at a very moderate pace for five to 10 minutes each day, and then slowly increase the distance and the speed until you are walking briskly for 30 minutes, Sharkey advises.

Even though 30 minutes a day is recommended, Sharkey says don't get locked in. Once you start walking, you may find reasons to set goals that motivate you to become more active or to begin other activities, such as biking or swimming.

Let's say you have some friends who are going on a long hike in the fall, and you get invited. You say, "Yeah, I think I'll do that." But then you realize that in order to do the hike, you are going to have to train for it. Setting goals may help you get in shape, Sharkey says.

"Be realistic about what you can do," he warns. "If your long-term goal is to be able to make that hike, set some short-term goals that will help you get there. Increase your distance gradually and throw in some hills to climb."

Sharing your goals with others is a good idea, he says, because once you've told someone who supports you that you're going to do something, it's harder to back down. Writing down the goals helps, too.

"For years I had a calendar where I wrote activities and something about the experience. I kept track of cycling miles to be sure I had the base to do a 100-mile trip," Sharkey says. "Writing goals down seems silly, but sometimes you say, 'I'll go a little longer so I can put it in my record.'"

Exercisers can read, watch television or enjoy mountain views while they work out on the center's stationary cardiovascular equipment.

Be sure to make regular activity — walking, biking or any favorite sport — an essential part of your day. Don't fall victim to the many excuses that will come to mind readily, like "I'm too busy," or "It's raining."

"If our nation's presidents can find time to exercise, certainly we can," Sharkey says. "And with all the new materials for clothing, rain and cold are no longer good excuses for not getting outside. I even bought some of those grippers for my shoes this winter."

In addition to working on increasing the level of physical activity for individuals, Sharkey stresses the importance of family activity.

"It amazes me how many of us feel the absolute obligation to get the dog out for a walk every day, but we don't take the same responsibility when it comes to our children," he says.

Often just making time available for children to be active is all it takes. Physical activity doesn't have to be organized sports, Sharkey says. The important thing is to promote muscle-powered versus machine-powered recreation. Get the kids on cross-country skis instead of snowmobiles. Kids are creative, he says. Give them a safe place to play, some balls and bats and a little encouragement, add some parents, and watch the fun begin.

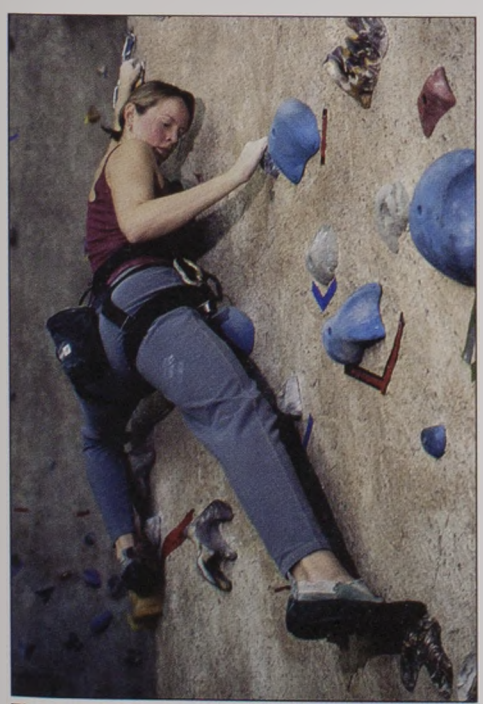
Communities need to do their part, also. Often all it takes is community effort to provide safe places for people to exercise and play.

"Community planning should always require a health impact statement that asks, 'Will this hinder or help people to be active?'" Sharkey says. "If communities want to be good places to live, they really ought to make that a priority."

Events that encourage physical activity, such as community walks and runs, should be inclusive and encourage everyone to join in. Sharkey recommends offering rewards to schools, businesses or organizations with the largest number of participants based on a percentage basis. This sort of approach is more likely to accomplish a public health goal than events that focus on who is the fastest, he says.

So consider doing your part to improve public health. For just 30 minutes each day, turn off the TV, step away from the computer, put down that book you're reading and head out for a walk. V

Sharkey offers more suggestions for improving health in his book "Fitness and Health," now in its fifth edition with publisher Human Kinetics and available online at www.humankinetics.com.



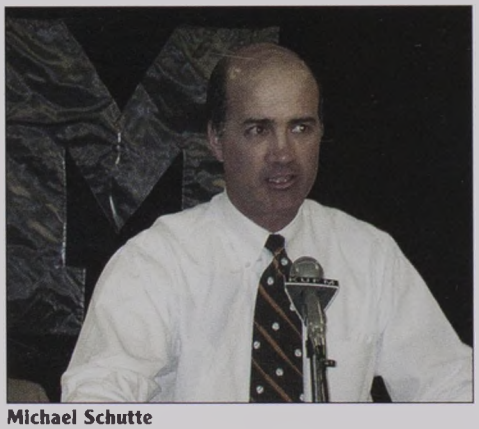
The center's climbing wall offers a challenging, year-round workout option.

Partnership Helps Prevent Sports Injuries

A new UM-based center will help educate Montana students about avoiding athletic injuries and staying fit into adulthood.

The Sports Health Institute is the brainchild of Dr. Michael Schutte, a surgeon with Northern Rockies Orthopaedic Specialists. The center will work to curb sports-related injuries by providing a pipeline for improved exercise science to reach Montana's coaches and students.

In addition, the center will teach all students – not just young athletes – how



Michael Schutte

to train, stay fit and avoid injuries. He hopes to instill proper fitness in young people that will carry through into adulthood.

Community Medical Center donated startup funding for the Sports Health Institute, while UM's Intercollegiate Athletics will provide the training expertise used in its programs. Missoula's Loyola-Sacred Heart High School served as the program's pilot. The program eventually will spread into other area schools.

Giving Native Americans a Voice

A project based at UM could help put more American Indians in newsrooms of the nation's media.

Dennis McAuliffe

Reznet, an online newspaper produced by Indian students nationwide for Indian readers, is the brainchild of UM journalism Associate Professor Dennis McAuliffe Jr., a member of the Osage tribe and a former Washington Post reporter. American Indians, he says, have little exposure to journalism classes and newspapers on reservations.

McAuliffe is working to change that, using a $250,000 grant from the John S. and James L. Knight Foundation. The Robert C. Maynard Institute for Journalism Education puts the site online so it is available to the public.

UM Promotes Better Community Health Care

A collaboration between Missoula's Partnership Health Center and the UM School of Pharmacy and Allied Health Sciences has brought increased pharmacy services to several community health centers in Montana.

The multiyear demonstration project, supported by $241,000 from the U.S. Bureau of Health Care, will benefit community health centers in Billings, Butte, Helena, Great Falls and Livingston, as well as grant recipient Partnership Health Center in Missoula.

Community health centers provide care for many of the state's residents who do not qualify for other assistance programs. Although the centers in Missoula and Billings have pharmacy services, the others do not. Clinical pharmacies are being established for patients with varied health problems.

Low-income clients depend upon drug programs, samples and contracts with community pharmacies to gain access to needed medications.

What Montanans Say About Tourism

Montana residents believe tourism can produce economic benefits, but they feel strongly that they should be involved in decisions affecting future tourism, according to a report from UM's Institute for Tourism and Recreation Research.

Among the trends and attitudes revealed by the survey are:

- Respondents thought more people moving to the state was the primary disadvantage of tourism, along with worse traffic and stress on infrastructure.
- Tourism is thought to have the most positive impacts on museums, cultural centers and job opportunities.
- Survey respondents support tourism and tourism development but do not see a connection between this type of economic development and their own financial benefit.

Montanans have mixed feelings about the money that tourism pumps into the state's economy.

Although most respondents indicated that they are at least somewhat informed about Montana's travel industry, few have been exposed to information regarding the industry's impact on the state's economy, environment and quality of life.

The report, "Resident Characteristics and Attitudes Regarding Tourism Development," is available online at

www.forestry.umt.edu/research/MFCES/programs/itrr. It was produced from a questionnaire mailed to 1,000 random Montana households during October and November 2001. The study achieved a 40 percent response rate.

Doing Business in Turbulent Times

A forum sponsored by UM's School of Business Administration and the Montana World Trade Center in June helped teach business leaders how to steer their companies through uncertain economic times.

The forum, "Managing Money in Turbulent Times," featured leading corporate executives from Microsoft and Charles Schwab.

"We put together this forum to help managers, owners, entrepreneurs, board members – anyone involved in leading a small or large business – not only survive but thrive during turbulent times," MWTC executive director Arnie Sherman says.

The intensive course offered participants practical techniques to help businesses stay flexible in front of a changing economy.

Examining Asbestos-related Diseases

Environmental Health Sciences at UM sponsored a summer conference to present cutting-edge research on all aspects of asbestos-related diseases. The conference, "New Directions and Needs in Asbestos Research," featured national and international asbestos experts, as well as the work of UM scientists.

The conference began with an overview of asbestos-related health and epidemiologic issues that stem from investigations of exposure in Libby, where asbestos-bearing vermiculite was mined from 1923 until 1990. Presenters and panel members explored the mechanisms of disease development and the use of genomic approaches in asbestos research.

Ken Olden, director of the National Institute of Environmental Health Sciences, gave the keynote address.

UM Hosts Summer Research Lectures

The NSF-EPSCOR Summer Research Lecture Series debuted with five world-class speakers: Missoula attorney William Rossbach discussing "Science in the Courtroom"; Bozeman paleontologist Frankie Jackson, talking about "Dinosaur Eggs and Embryos from Argentina"; Andrea Stierle, a Montana Tech researcher, exploring "A Cancer Cure That Grows in Trees and Other Fungal Stuff"; UM microbial ecologist Mary Poss, lecturing on "Pathogens and Predators: The Evolution and Biology of Retroviral Infections"; and Professor Janne Cannon, of the University of North Carolina at Chapel Hill, discussing "Women and Minorities in the Sciences."

The lecture series was organized by UM's National Science Foundation Experimental Program to Stimulate Competitive Research, funded by NSF to improve the science and technology infrastructure in Montana.

Kudos to Us

Believe it or not, you are holding an award-winning publication in your hands. Vision 2001 was honored with a national Silver award in the external publications category of The Admissions and Marketing Advertising Awards competition. We're especially proud because this magazine is produced completely in-house and it triumphed over publications done for other universities by external public relations and marketing firms at a much greater cost.

Research View, UM's research newsletter and Vision's sister publication, also won a Silver award in the same national competition. The

Vision 2001 picked up a handful of awards.

newsletter picked up another Silver award from the Council for Advancement and Support of Education District VIII, an organization that honors the best marketing efforts from colleges and universities in the Pacific Northwest and three western Canadian provinces.

Both Vision and Research View are produced by graphic designer Mike Egeler, photographer Todd Goodrich and the writing and editing team of Rita Munzenrider, Patia Stephens, Brenda Day and Cary Shimek.


Doug Emlen

Stephens also took home a Bronze CASE award for her Web version of Vision 2001, and Shimek won another Bronze for a story he penned titled "Beetle Battles: The Strange World of Horned Combatants," which appeared in the spring 2001 Research View. The story described the groundbreaking work being done with beetles by UM evolutionary biologist Doug Emlen *(see related story on page 32)*. V

EMLEN AT THE WHITE HOUSE

UM Researcher Earns Highest U.S. Honor for Young Scientists

by Cary Shimek

Doug Emlen's UM research on the evolution of beetles brought him face to face with President George Bush. Emlen visited the White House to claim the 2001 Presidential Early Career Award for Scientists and Engineers July 12.

His award is the highest honor bestowed by the U.S. government on scientists and engineers in the early stages of their careers. Only 20 of the awards are presented to National Science Foundation-supported researchers across the nation each year. Emlen, 34, is the first Montana researcher to receive the award.

At a Washington, D.C., awards reception, UM researcher Doug Emlen (right) is congratulated by Jack Marburger, director of the federal Office of Science and Technology. In the center is Rita Colwell, director of the National Science Foundation.

The letter notifying Emlen of the honor read, "You are a shining example to future generations of researchers. You represent the best of the group of scientists and engineers who will be responsible for America's 21st century greatness."

An associate professor in UM's Division of Biological Sciences, Emlen says of his award, "It's amazing. To be recognized at this level of distinction for doing what I love — research and teaching — means a lot to me."

The UM scientist earned a $650,000 Faculty Early Career Development grant from NSF last year, which made him eligible for the presidential award. The career grants encourage early development of academic careers that stimulate the discovery process through exciting research, inspired teaching and enthusiastic learning. Typically only 5 to 10 percent of career award recipients go on to earn the presidential award.

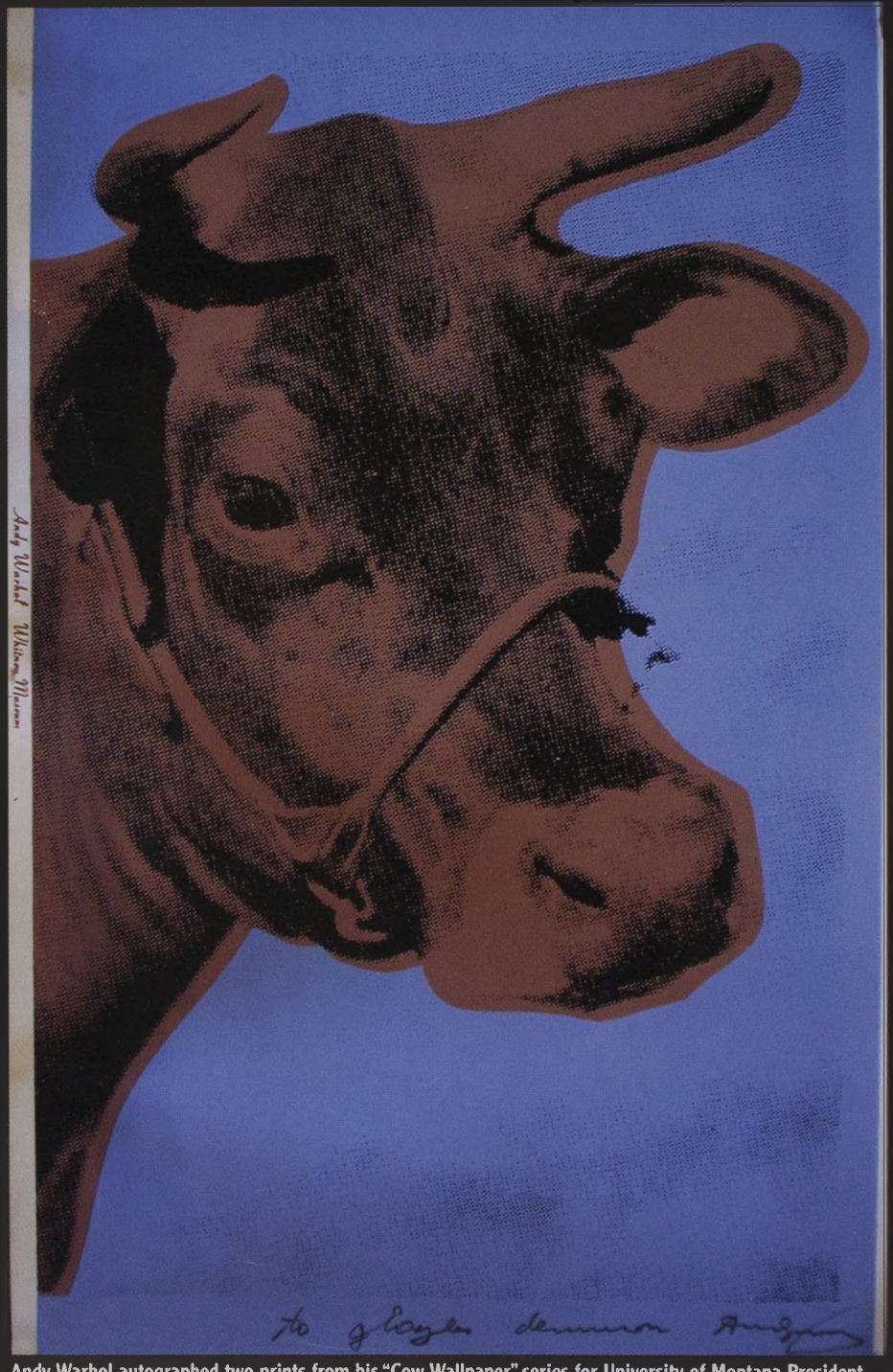
Don Christian, associate dean of biological sciences, says, "Having a UM faculty member receive this recognition underscores the world-class scientific research conducted by faculty and students here. Faculty members like Doug view their research both as a way to answer key scientific questions and to provide the best possible learning opportunities for students. We're really excited to see his accomplishment and future recognized in this way at the national level."

Much of Emlen's research involves the study of evolutionary biology using a small variety of horned beetle. He has found that male beetles have tremendous diversity in the size and shape of their horns, and some invest more energy in growing their horns – relative to their size – than a bull moose does antlers.

Big-horned beetles are better fighters, which helps them get mates, but horns may grow at the expense of other body parts. Depending on the species, big horns may mean smaller eyes, wings or antennae, giving hornless beetles certain advantages.

Emlen's beetle studies have given insight into some of biology's most basic questions: Why is there so much diversity in life? How can there be so much diversity among closely related species or even within the same species?

Emlen has worked at UM since 1996. Before that he was a postdoctoral research fellow in the Duke University Department of Zoology. He earned his doctoral degree from the Princeton University Department of Ecology and Evolutionary Biology in 1994. In addition to his research, he teaches UM classes on insect biology, and insect behavior and evolution. V



Andy Warhol autographed two prints from his "Cow Wallpaper" series for University of Montana President George Dennison in the late 1970s while Dennison was working at Colorado State University. Dennison donated this print to the Montana Museum of Art and Culture's permanent collection when he became UM president in 1990.

The University of Montana

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